SEARCH REQUEST FORM **Scientific and Technical Information Center - EIC2800**

Rev. 3/15/2004 This is an experimental format -- Please give suggestions or comments to Jeff Harrison, JEF-4B68, 272-2511.

Date 4/19/04 Serial # 09/846,127 Priority Application Date 20010430

Your Name M. Lewis Examiner # ____

AU 2829 Phone 272-1838 Room 5A30

In what format would you like your results? Paper is the default. PAPER DISK EMAIL

If submitting more than one search, please prioritize in order of need.

The EIC searcher normally will contact you before beginning a prior art search. If you would like to sit with a searcher for an interactive search, please notify one of the searchers.

04-12-04 A11:14 IN

Where have you searched so far on this case?

Circle: USPT DWPI EPO Abs JPO Abs IBM TDB

Other: ____

What relevant art have you found so far? Please attach pertinent citations or Information Disclosure Statements. ____

What types of references would you like? Please checkmark:

Primary Refs ✓ Nonpatent Literature ___ Other ____

Secondary Refs ✓ Foreign Patents ___

Teaching Refs ___

What is the topic, such as the **novelty**, motivation, utility, or other specific facets defining the desired **focus** of this search? Please include the concepts, synonyms, keywords, acronyms, registry numbers, definitions, structures, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract and pertinent claims.

Claims 1-17 & 21-40

Problem: See page 1 lines 14-31

Solution: " " 2 " 1-9

Please also focus on the annealing process.

US 6,023,124 US 6,034,479

" 6,328,620 US 5,557,546

Staff Use Only **Type of Search** **Vendors**

Searcher: Hertzog	Structure (#) ____	STN ✓
Searcher Phone: 2-2663	Bibliographic ✓	Dialog ✓
Searcher Location: STIC-EIC2800, JEF-4B68	Litigation ____	Questel/Orbit ____
Date Searcher Picked Up: 4/19/04 11:36	Fulltext ____	Lexis-Nexis ____
Date Completed: 4/20/04	Patent Family ____	WWW/Internet ____
Searcher Prep/Rev Time: 210	Other ____	Other ____
Online Time: 116		

```
     FILE 'HCAPLUS' ENTERED AT 12:52:27 ON 19 APR 2004
L2            3 S (US 20030080330 OR US 6023124 OR US
                6034479 OR US 6328620 OR US 5557596)/PN
L3            1 S US6558968/PN
L4            4 S L2-L3
L5           SEL L4 1- RN :      25 TERMS

     FILE 'REGISTRY' ENTERED AT 12:54:18 ON 19 APR 2004
L6          367 S (O TI/ELF AND 1/NC AND 2/ELC) OR O.TI/MF
L7          142 S (O TA/ELF AND 1/NC AND 2/ELC) OR O.TA/MF
L8           26 S (N SI W/ELF AND 1/NC AND 3/ELC) OR NSIW/MF
L9           47 S (AL O TA/ELF AND 1/NC AND 3/ELC) OR AL.O.TA/MF
L10         130 S (AL N O/ELF AND 1/NC AND 3/ELC) OR AL.N.O/MF
L11           0 S (0-99 PT AND 0-99 AU AND 0-99 MO AND 0-99 TA AND 0-99 IR AND
                  0-99 RU AND 0-99 CR)/MAC AND 1/NC
L12        1169 S (PT OR AU OR MO OR TA OR IR OR RU OR CR)/MF AND 1/NC

     FILE 'HCAPLUS' ENTERED AT 13:03:22 ON 19 APR 2004
L13      144958 S L6-10
L14      478700 S ANNEALING+ALL/CT
L15       88792 S TUNNEL?
L16               QUE LAMEL? OR FILM? OR THINFILM? OR LAYER? OR OVERLAY? OR OVERLAID?
           OR LAMIN? OR MULTI(W)LAYER? OR MULTILAYER? OR SHEET? OR LEAF? OR FOIL?
           OR COAT? OR TOPCOAT? OR OVERCOAT? OR VENEER? OR SHEATH? OR COVER? OR
           ENVELOP? OR ENCAS? OR ENWRAP? OR OVERSPREAD? OR LINING? OR LINER#
L17         482 S (METAL?(2A)CLUSTER?)(2A)(DIELECTRIC? OR OXIDE? OR INSULAT?)
L18       78431 S EMITT!R# OR EMMITT!R# OR COLLECT!R#
L19           3 S L18 AND L15(L)L16 AND L14 AND L13
L20           2 S L19 NOT L4
L21           2 S L20 AND P/DT
L22          20 S L18 AND L15(L)L16 AND L14 AND L12
L23           1 S L22 AND L21
L24          19 S L22 NOT L23
L25          15 S L24 NOT P/DT NOT PD>20010430
L26           4 S L24 NOT L25
L29          14 S L15(L)L16 AND L17
L30          10 S L29 NOT P/DT NOT PD>20010430
L31           1 S L29 AND P/DT
L32               QUE PT OR PLATIN? OR AU OR GOLD OR MO OR MOLYBDEN?
L33               QUE TA OR TANTAL? OR IR OR IRIDIDIUM
L34               QUE RU OR RUTHEN? OR CR OR CHROMI?
L35               QUE TAALO OR ALO(2N)N OR TIO OR TIO2 OR TIO3
L36               QUE TAO OR TAO2 OR TAO3 OR WSIN
L37               QUE TALO(2W)N
L38               QUE L32-L37
L39          37 S L38 AND L18 AND L15(L)L16 AND L14
L40          20 S L39 NOT L21 NOT L25 NOT L30-31
L41          13 S L40 NOT P/DT NOT PD>20010430
L42           7 S L40 NOT L41
L43     2707144 S ANNEAL? OR HEAT? OR THERMAL(N)(RAPID? OR PROCESS? OR TREAT?)
L44        4549 S (H01L-21/324 OR H01L-21/477 OR H01L-21/268 OR H01L-21/428)/IC
                  SET PLU OFF
L45               QUE PT OR PLATIN? OR AU OR GOLD OR MO OR MOLYBDEN?
L46               QUE TA OR TANTAL? OR IR OR IRIDIDIUM
L47               QUE RU OR RUTHEN? OR CR OR CHROMI?
L48               QUE TAALO OR ALO(2N)N OR TIO OR TIO2 OR TIO3
L49               QUE TAO OR TAO2 OR TAO3 OR WSIN
```

```
L50              QUE TALO(2W)N
L51      2171032 S L45-L50
L52       368433 S L43-44 AND L51
L53         6723 S CATHODE# AND L52
L54          408 S L18 AND L53
L55            3 S L15(L)L16 AND L54
L56            0 S L55 NOT L39 NOT L21 NOT L25 NOT L30-31
L57        57604 S L43-44 AND (EMIT? OR EMISS?)
L58          575 S TUNNEL? AND L57
L59           39 S L58 AND CATHODE#
L60           36 S L59 NOT L55 NOT L39 NOT L21 NOT L25 NOT L30-31
L61           30 S L60 NOT P/DT NOT PD>20010430
L62            6 S L60 NOT L61
```

```
File   2:INSPEC 1969-2004/Apr W2
        (c) 2004 Institution of Electrical Engineers

Set     Items   Description
S1       9623   CI= (TI BIN(S)O BIN)(S)NE=2
S2       1905   CI= (TA BIN(S)O BIN)(S)NE=2
S3         11   CI= (NI SS(S)SI SS(S)W SS)(S)NE=3
S4         71   CI= (AL SS(S)O SS(S)TA SS)(S)NE=3
S5        468   CI= (AL SS(S)O SS(S)N SS)(S)NE=3
S6      11853   S1:S5
S7      85791   CI=(PT SS OR AU SS OR MO SS OR TA SS OR IR SS OR RU SS OR CR)
S8      36138   ELECTRODES!  (January 1969)
S9      10760   CATHODES!  (January 1969)
S10     39318   S8:S9
            2290  ELECTRON EMISSION/DF  (January 1969)
             133  EMISSION/DF  (January 1995)
           20391  ELECTRON FIELD EMISSION:THERMIONIC ELECTRON EM
            9198  ELECTRON BEAMS/DF  (January 1969)
S11     31602   R1,R2,R4:R9,R11/DF
S12      2117   (S6 OR S7) AND (S8:S11)
S13        43   S6 AND S7 AND (S8:S11)
   R1   122281       21 *ANNEALING (January 1971)
   R2    39473   O   27  HEAT TREATMENT (January 1969)
   R3      430   N    8  ELECTRON BEAM ANNEALING (January 1985)
   R4     1220   N   11  INCOHERENT LIGHT ANNEALING (January 1985)
   R5     3347   N   14  LASER BEAM ANNEALING (January 1981)
   R6      895   N    9  MAGNETIC ANNEALING (January 1977)
   R7     5788   N   10  RAPID THERMAL ANNEALING (January 1995)
   R8     1932   N    8  RECRYSTALLISATION ANNEALING (January 1977)
   R9     1304   N    3  SOLUTION ANNEALING (January 1977)
   R21    3967   R   12  CC=B8610   Power   applications   in   metallurgical
                         industries
   R22    6758   R   14  CC=C3350C  Control  applications  in  metallurgical
                         industries
          120185  ANNEALING:SOLUTION ANNEALING
          135730  CC=A6170A:CC=C3350C
S14    174983   R1:R9/DF OR R17:R22
S15         8   S13 AND S14
S16    602756   ANNEAL? OR HEAT? OR THERMAL(N)(RAPID? OR PROCESS? OR TREAT-
            ?)  OR RTA OR RTP OR RTO OR MELT? OR SPHERODI? OR GALVANNEAL?
S17         1   S13 AND S16 NOT S15
```

```
L21  ANSWER 1 OF 2  HCAPLUS  COPYRIGHT 2004 ACS on STN
AN   2004:219679  HCAPLUS DN   140:256297
TI   Tunneling-effect thermionic energy converters
IN   Kucherov, Yan R.; Hagelstein, Peter L.
PA   Eneco Inc., USA
     PATENT NO.        KIND  DATE          APPLICATION NO.   DATE
     ---------------   ----  --------      ---------------   --------
PI   US 2004050415     A1    20040318      US 2002-243455    20020913
AB    The invention concerns tunneling-effect converters of thermal energy to
      electricity with an emitter and a collector separated from each other by a
      distance that is comparable to atomic dimensions and where tunneling effect
      plays an important role in the charge movement from the emitter to the
      collector across the gap separating such emitter and collector.  At least one
      of the emitter and collector structures includes a flexible structure.
      Tunneling-effect converters include devices that convert thermal energy to
      elec. energy and devices that provide refrigeration when elec. power is
      supplied to such devices.
IC   ICM  H01L031-00
NCL  136252000
CC   52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
     Section cross-reference(s): 48, 76
IT   Electric conductors
        (Si coated with; tunneling-effect energy converters
        of heat to elec. energy)
IT   Metals, uses
     RL: TEM (Technical or engineered material use); USES (Uses)
        (coating; tunneling-effect energy converters of
        heat to elec. energy)
IT   Coating materials
        (elec. conductive; tunneling-effect energy converters of heat
        to elec. energy)
IT   7440-21-3, Silicon, uses
     RL: TEM (Technical or engineered material use); USES (Uses)
        (Ni-coated; tunneling-effect energy converters of
        heat to elec. energy)
IT   7440-02-0, Nickel, uses
     RL: TEM (Technical or engineered material use); USES (Uses)
        (Si coated with; tunneling-effect energy converters
        of heat to elec. energy)
IT   1313-99-1, Nickel oxide, uses   1314-35-8, Tungsten oxide, uses
     11129-89-8, PLatinum oxide   12624-27-0, Rhenium oxide   12645-46-4,
     Iridium oxide   20667-12-3, Silver oxide (Ag2O) 59763-75-6,
     Tantalum oxide   61970-39-6, Osmium oxide
     RL: TEM (Technical or engineered material use); USES (Uses)
        (coating; tunneling-effect energy converters of
        heat to elec. energy)
IT   7429-90-5, Aluminum, uses
     RL: DEV (Device component use); USES (Uses)
        (collector; tunneling-effect energy converters of heat to
        elec. energy)
```

L21 ANSWER 2 OF 2 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:943807 HCAPLUS DN 140:11437
TI Design of a gate-controlled negative resistance diode device using band-to-band tunneling
IN Chi, Min-Hwa
PA Taiwan Semiconductoring Manufacturing Company, Taiwan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6657240	B1	20031202	US 2002-56622	20020128

AB The invention relates to the design of a gate-controlled neg. resistance diode device using band-to-band **tunneling**, such that the device uses a relatively small d.c. bias. The device comprises, first, a semiconductor **layer** in a substrate. The semiconductor **layer** contains an **emitter** region and a barrier region. The barrier region is in contact with the **emitter** region and is laterally adjacent to the **emitter** region. The semiconductor **layer** contains a **collector** region. A drift region comprises the semiconductor **layer** between the barrier region and the **collector** region. Finally, a gate comprises a conductor **layer** overlying the drift region, the barrier region, and at least a part of the **emitter** region with an insulating **layer** lying between the **layers**.
IC ICM H01L029-74
NCL 257162000; 257163000
IT Metals, uses
Nitrides
Silicides
RL: DEV (Device component use); USES (Uses)
(conductive **layer;** design of gate-controlled neg. resistance diode device using band-to-band **tunneling**)
IT Oxides (inorganic), uses
RL: DEV (Device component use); USES (Uses)
(insulator **layer;** design of gate-controlled neg. resistance diode device using band-to-band **tunneling**)
IT **1314-61-0**, Tantalum oxide 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 11105-01-4, Silicon nitride oxide 12033-89-5, Silicon nitride, uses
RL: DEV (Device component use); USES (Uses)
(insulator **layer;** design of gate-controlled neg. resistance diode device using band-to-band **tunneling**)
IT **7440-21-3**, Silicon, uses
RL: DEV (Device component use); USES (Uses)
(semiconductor **layer**, conductive **layer;** design of gate-controlled neg. resistance diode device using band-to-band **tunneling**)

===

L25 ANSWER 1 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 2002:254732 HCAPLUS Full-text DN 136:377376

TI Ballistic electron surface-emitting cold cathode by porous polycrystalline silicon film formed on glass substrate

AU Komoda, Takuya; Ichihara, Tsutomu; Honda, Yoshiaki; Aizawa, Koichi; Koshida, Nobuyoshi

SO Materials Research Society Symposium Proceedings (2001), 638(Microcrystalline and Nanocrystalline Semiconductors--2000), F4.1.1-F4.1.12
CODEN: MRSPDH; ISSN: 0272-9172

AB A porous polycryst. Si (PPS) **film** is useful as a ballistic electron **emitter** for excitation source of a flat panel display. A 1.5 μm polysilicon **layer** is deposited on a Si substrate by Low Pressure Chemical Vapor Deposition (LPCVD) technique and subsequently anodized in an ethanoic HF solution and oxidized in a Rapid Thermal Oxidation (RTO) furnace. A thin Au **film** is deposited onto the RTO-treated PPS **layer** and used as a top electrode. The electron emission current Ie and the diode current Ips are measured as a function of the bias voltage Vps. Electron emission of which onset voltage is .apprx.8 V rapidly increases with increasing Vps. The Ie value reaches .apprx.2 mA/cm2 for Vps = 20 V at which the emission efficiency defined as Ie/Ips is .apprx.1%. The emission mechanism also was studied in terms of the correlation between the emitted electron energy and the structure of PPS **layer**. The observed energy distribution curve of output electrons suggests that the PPS **layer** acts as a ballistic transport medium and the emission occurs based on multiple **tunnelling** through Si nanocrystallites. The PPS **layer** is also formed on the polysilicon **layer** deposited on a glass substrate by Plasma Enhanced Chemical Vapor Deposition (PCVD) technique. In this case, the **film** is treated by an electrochem. oxidation (ECO) in an H2SO4 solution Similar emission characteristics are observed, although the emission current is lower than that formed on Si substrate. The authors also demonstrate the 2.6 in diagonal 53+40 pixels multicolor flat panel display. The authors name it ballistic electron surface-emitting display device (BSD). BSD shows the possible application to the future flat panel display.

CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 76

IT Nanocrystals
Tunneling
(in ballistic electron surface-emitting cold cathode by porous polycryst. silicon **film** formed on glass substrate for flat-panel display)

IT **7440-21-3**, Silicon, processes
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(ballistic electron surface-emitting cold cathode by porous polycryst. silicon film formed on glass substrate for flat-panel display)

IT **7440-57-5**, Gold, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(ballistic electron surface-emitting cold cathode by porous polycryst. silicon film formed on glass substrate for flat-panel display)

IT **7440-21-3**, Silicon, processes
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)

(ballistic electron surface-emitting cold cathode by porous polycryst. silicon film formed on glass substrate for flat-panel display)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)
IT **7440-57-5**, Gold, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(ballistic electron surface-emitting cold cathode by porous polycryst. silicon film formed on glass substrate for flat-panel display)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 2 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:587354 HCAPLUS Full-text DN 129:296795
TI Preparation of Si oxide **films** for MIS type **tunnel emitter** by hollow cathode enhanced DC plasma oxidation
AU Usami, Kouichi; Miyake, Eitaro; Moriya, Masataka
SO Shinku (1998), 41(7), 622-627
CODEN: SHINAM; ISSN: 0559-8516
AB A hollow cathode enhanced DC plasma oxidation system was developed. Using this system, thin Si oxide **films** of less than 15 nm thickness were grown on n-type Si(100) substrates for the application as barrier insulator of **tunnel emitter**. The oxide **film** thickness and the **film** quality were estimated by the ellipsometery and the XPS energy peak shift of Si 2p core levels, resp. On the oxide **film**, thin Au electrode was deposited and MIS diode type **tunnel emitter** was fabricated. The elec. properties of the diode, such as I-V characteristics and junction resistance were measured for various oxidation conditions. The electron emission current in vacuum from the **tunnel emitter** having 0.2 mm2 emission area was measured. For a typical sample, with diode voltage of 13 V, the measured c.d. is of the order of 10 μA/mm2.
CC 76-3 (Electric Phenomena)
ST **tunnel emitter** silicon oxide **film** prepn;
plasma oxidn silicon oxide **film** prepn
IT Electron emission
Electron sources
MIS devices
Oxidation
Plasma
(preparation of Si oxide **films** for MIS type **tunnel emitter** by hollow cathode enhanced d.c. plasma oxidation)
IT **7440-57-5**, Gold, uses
RL: DEV (Device component use); USES (Uses)
(preparation of Si oxide **films** for MIS type **tunnel emitter** by hollow cathode enhanced d.c. plasma oxidation)
IT 7631-86-9P, Silica, uses
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(preparation of Si oxide **films** for MIS type **tunnel emitter** by hollow cathode enhanced d.c. plasma oxidation)
IT **7440-21-3**, Silicon, uses
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(preparation of Si oxide **films** for MIS type **tunnel emitter** by hollow cathode enhanced d.c. plasma oxidation)
IT **7440-57-5**, Gold, uses
RL: DEV (Device component use); USES (Uses)

(preparation of Si oxide **films** for MIS type **tunnel**
emitter by hollow cathode enhanced d.c. plasma oxidation)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)
IT **7440-21-3**, Silicon, uses
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT
(Reactant or reagent); USES (Uses)
(preparation of Si oxide **films** for MIS type **tunnel**
emitter by hollow cathode enhanced d.c. plasma oxidation)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 3 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:448587 HCAPLUS Full-text DN 129:224275
TI Electron emission characteristics of a-diamond coated field
emitters
AU Choi, W. B.; Ding, M. Q.; Zhirnov, V. V.; Myers, A. F.; Hren, J. J.;
Cuomo, J. J.
SO International Vacuum Microelectronics Conference, Technical Digest, 10th,
Kyongju, S. Korea, Aug. 17-21, 1997 (1997), 527-531 Publisher: Electronic
Display Industrial Research Association of Korea, Seoul, S. Korea.
CODEN: 66KIAM
AB The field emission characteristics of amorphous diamond **coatings** on needle-shaped Mo and Si **emitters** were measured and analyzed. N doped a-diamond shows significantly higher emissivity than undoped a-diamond. Current conditioning improves current stability and enhances the c.d. Thick **coatings** lower the emissivity and change the slope of the I-V curve. At low applied fields, the current depends on temperature, such that it can be explained by a substantial thermionic contribution to the total current. At higher fields, the temperature dependence disappears, becoming dominated by the **tunneling** current. The enhanced emissivity can be explained by the narrow band gap and N doping.
CC 76-12 (Electric Phenomena)
ST electron emission amorphous diamond field **emitter**
IT Films
(amorphous; electron emission characteristics of amorphous-diamond
coated field **emitters**)
IT Field emission
Field **emitters**
Thermionic emission
Tunneling current
(electron emission characteristics of amorphous-diamond **coated**
field **emitters**)
IT Band gap
(electron emission characteristics of amorphous-diamond coated field
emitters in relation to narrowness of)
IT Dopants
(nitrogen; electron emission characteristics of amorphous-diamond
coated field **emitters**)
IT 7782-40-3, Diamond, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(coatings; electron emission characteristics of amorphous-diamond
coated field **emitters**)
IT 7727-37-9, Nitrogen, uses
RL: MOA (Modifier or additive use); USES (Uses)
(dopant; electron emission characteristics of amorphous-diamond coated

field **emitters**)
IT **7439-98-7**, Molybdenum, uses **7440-21-3**, Silicon, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**emitter**; electron emission characteristics of
amorphous-diamond coated field **emitters**)
IT **7439-98-7**, Molybdenum, uses **7440-21-3**, Silicon, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**emitter**; electron emission characteristics of
amorphous-diamond coated field **emitters**)
RN 7439-98-7 HCAPLUS
CN Molybdenum (8CI, 9CI) (CA INDEX NAME)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 4 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:448530 HCAPLUS Full-text DN 129:224232
TI MIS **emitter** with epitaxial CaF2 layer as insulator
AU Miyamoto, Yasuyuki; Yamaguchi, Akemi; Oshima, Kazuyoshi; Saitoh, Wataru; Asada, Masahiro
SO International Vacuum Microelectronics Conference, Technical Digest, 10th, Kyongju, S. Korea, Aug. 17-21, 1997 (1997), 226-230 Publisher: Electronic Display Industrial Research Association of Korea, Seoul, S. Korea.
CODEN: 66KIAM
AB MIS **emitter** with epitaxial CaF2 insulator **layer** is presented. A 8nm thick epitaxial CaF2 **layer** was grown on n+-Si substrate and MIS cathode with 10μm2 **emitter** region was fabricated by evaporation of 10nm-thick Au and semiconductor process. Two different type of I-V characteristics was observed The conventional **tunnel** emission shows emission current of 22pA at 2.4 mA as **emitter** current and 7V as **emitter** voltage. The other I-V characteristics shows emission current of 5.6 nA at 2.2 mA as **emitter** current and 4.5 V as **emitter** voltage although it has instability of the current.
CC 76-12 (Electric Phenomena)
ST MIS **emitter** epitaxial calcium fluoride layer
IT Cathodes
Dielectric films
Epitaxial films
MIS devices
Semiconductor device fabrication
(MIS **emitter** with epitaxial calcium fluoride layer as
insulator)
IT **Tunneling**
(in MIS **emitter** with epitaxial calcium fluoride **layer**
as insulator)
IT **7440-21-3**, Silicon, uses **7440-57-5**, Gold, uses
7789-75-5, Calcium fluoride (CaF2), uses
RL: DEV (Device component use); USES (Uses)
(MIS **emitter** with epitaxial calcium fluoride layer as
insulator)
IT **7440-21-3**, Silicon, uses **7440-57-5**, Gold, uses
RL: DEV (Device component use); USES (Uses)
(MIS **emitter** with epitaxial calcium fluoride layer as
insulator)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 5 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:205533 HCAPLUS Full-text DN 128:251944
TI GMR effect observed in hot electron transport
AU Mizushima, K.; Kinno, T.; Tanaka, K.; Yamauchi, T.
SO Nippon Oyo Jiki Gakkaishi (1997), 21(12), 1274-1280
CODEN: NOJGD3; ISSN: 0285-0192
AB Hot electron transport across an Fe/Au/FE spin valve was examined by measuring the **collector** current of a three-terminal structure composed of an Al/AlOx **emitter**, the spin-valve base, and an nSi **collector**. The current changed more than 200% when a magnetic field was applied. The magnitude of this change decreased monotonically when the **emitter** voltage rose above 1 V, and sharply when the voltage fell below 1 V. No anomaly was observed at the voltage (.apprx.1.5 V) corresponding to the sharp peak in the d. of states of the minority spin bands in Fe. These results were analyzed by using a simple model that takes account of spin-dependent scattering in the base as well as the refraction and reflection of electrons at the base/**collector** interface.
CC 77-8 (Magnetic Phenomena)
Section cross-reference(s): 56, 57, 73, 76
IT Interface
(base/**collector**; GMR effect observed in hot electron transport)
IT 7429-90-5, Aluminum, properties **7440-57-5**, Gold, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**laminated** base plate, **tunneling**.; GMR effect observed in hot electron transport)
IT 7439-89-6, Iron, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**laminated** base plate, **tunneling**; GMR effect observed in hot electron transport)
IT **7440-21-3**, Silicon, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(n-, wafer; GMR effect observed in hot electron transport)
IT **7440-57-5**, Gold, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**laminated** base plate, **tunneling**.; GMR effect observed in hot electron transport)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)
IT **7440-21-3**, Silicon, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(n-, wafer; GMR effect observed in hot electron transport)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 6 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1997:596303 HCAPLUS Full-text DN 127:286727
TI A novel low-voltage ballistic-electron-emission source
AU Hagen, C. W.; Van Bakel, G. P. E. M.; Borgonjen, E. G.; Kruit, P.; Kazmiruk, V. V.; Kudryashov, V. A.
SO International Vacuum Microelectronics Conference, 9th, St. Petersburg, Russia, July 7-12, 1996 (1996), 358-362 Publisher: Nevskii Kur'er, St. Petersburg, Russia.
CODEN: 65AAA9
AB A novel **tunnel** junction **emitter** based on ballistic electron transmission through ultra-thin metal **foils** is proposed as an electron source. From a simple planar **tunneling** model and Monte-Carlo simulations either a high-brightness monochromatic electron source can be obtained or a high-current source with energy spread comparable with a field emission source. Free-standing 5 nm thick Pt **films** were successfully fabricated for the construction of a **tunnel** junction electron source, in which a UHV-STM was used as a tip-**emitter** positioning device.
CC 76-12 (Electric Phenomena)
IT **7440-06-4**, Platinum, processes **7440-21-3**, Silicon, processes 12033-89-5, Silicon nitride, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in fabrication of low-voltage ballistic-electron-emission source from tunnel junctions)
IT **7440-06-4**, Platinum, processes **7440-21-3**, Silicon, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in fabrication of low-voltage ballistic-electron-emission source from tunnel junctions)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

==

L25 ANSWER 7 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:596279 HCAPLUS Full-text DN 127:286710
TI Surface application of chromium silicide for improved stability of field **emitter** arrays
AU Chung, In-Jae; Hariz, A.; Haskard, M. R.; Ju, B. K.; Oh, M. H.
SO International Vacuum Microelectronics Conference, 9th, St. Petersburg, Russia, July 7-12, 1996 (1996), 245-249 Publisher: Nevskii Kur'er, St. Petersburg, Russia.
CODEN: 65AAA9
AB This paper studies the merits of Cr silicide **coating** of microtips. The Cr **coated** Si microtips were prepared by the silicidation process. The current-voltage characteristics, current fluctuation and surface morphologies of each sample were measured and analyzed. The application of Cr silicide to Si field **emitters** decreases the current fluctuation range to .apprx.50% that of a pure Si **emitter** and shows high discharge resistance. Also, it increases the emission current and reduces the onset voltage of **tunneling**. The reason for this stabilization can be explained by the reduced number of chemical active sites resulting in a silicide-protected and chemical-stable **layer**, and higher elec. conductivity of the material.
CC 76-12 (Electric Phenomena)
ST field **emitter** chromium silicide silicon
IT Field emission cathodes

(chromium silicide-coated silicon microtips for field-**emitter** arrays)
IT Fluctuations
(current; of chromium silicide-coated silicon microtips for field-**emitter** arrays)
IT Electric current
(fluctuations; of chromium silicide-coated silicon microtips for field-**emitter** arrays)
IT Siliconizing
(in formation of chromium silicide-coated silicon microtips for field-**emitter** arrays)
IT Electric conductivity
Electric current-potential relationship
Electric discharge
Surface structure
Tunneling
Work function
(of chromium silicide-**coated** silicon microtips for field-**emitter** arrays)
IT **7440-21-3**, Silicon, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(chromium silicide-coated silicon microtips for field-**emitter** arrays)
IT 12626-44-7P, Chromium silicide
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(chromium silicide-coated silicon microtips for field-**emitter** arrays)
IT **7440-47-3**, Chromium, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(chromium silicide-coated silicon microtips for field-**emitter** arrays)
IT **7440-21-3**, Silicon, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(chromium silicide-coated silicon microtips for field-**emitter** arrays)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)
IT **7440-47-3**, Chromium, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(chromium silicide-coated silicon microtips for field-**emitter** arrays)
RN 7440-47-3 HCAPLUS
CN Chromium (8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 8 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:580144 HCAPLUS Full-text DN 127:285274
TI Ballistic-electron-emission spectroscopy on an Fe/Au/Fe multilayer
AU Kinno, T.; Tanaka, K.; Mizushima, K.
SO Physical Review B: Condensed Matter (1997), 56(8), R4391-R4393
CODEN: PRBMDO; ISSN: 0163-1829

AB The effect of a magnetic field on the current flowing across a magnetic **multilayer** was studied by ballistic-electron-emission spectroscopy. Electrons were injected from a **tunneling** tip to a Au/Fe/Au/Fe/Au **multilayer** formed on n-type Si(100) as a base, and the current that flowed into the n-type Si was detected as a **collector** current. Under application of an external magnetic field the **collector** current changed with a hysteresis that should correspond to that of magnetization of the **multilayer**, as confirmed in an experiment using a 3-terminal device. The change of the relative spin direction was detected with nanometer-order resolution as the change of the **collector** current.

CC 73-6 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 76, 77

ST ballistic electron emission gold iron multilayer; magnetic multilayer metal ballistic electron emission; magnetoelec ballistic electron emission gold iron; spin electron emission ballistic gold iron; **collector** current electron emission gold iron

IT Electric current
(**collector**; ballistic-electron-emission spectroscopy on iron/gold/iron multilayer with magnetic field effect)

IT **7440-21-3**, Silicon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(ballistic-electron-emission spectroscopy on iron/gold/iron multilayer with magnetic field effect)

IT 7439-89-6, Iron, properties **7440-57-5**, Gold, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(ballistic-electron-emission spectroscopy on iron/gold/iron multilayer with magnetic field effect)

IT **7440-21-3**, Silicon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(ballistic-electron-emission spectroscopy on iron/gold/iron multilayer with magnetic field effect)

RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

IT **7440-57-5**, Gold, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(ballistic-electron-emission spectroscopy on iron/gold/iron multilayer with magnetic field effect)

RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

==

L25 ANSWER 9 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:330491 HCAPLUS Full-text DN 125:46606
TI Diamond coated Si and Mo field **emitters**: diamond thickness effect
AU Zhirnov, V. V.; Choi, W. B.; Cuomo, J. J.; Hren, J. J.
SO Applied Surface Science (1996), 94/95, 123-128
CODEN: ASUSEE; ISSN: 0169-4332

AB Individual Si and Mo field **emitters** were **coated** with synthetic high-pressure diamond particles by dielectrophoresis. A comparison of the field emission characteristics before and after **coating** showed significant shifts of the I-V curves depending on the thickness of the **coatings**. A model of emission through the diamond **layer** is proposed that depends primarily upon **tunneling** through the Schottky barrier into diamond, while assuming a negligible barrier

to emission from the diamond surface into vacuum. This model yields a value of the effective work function in agreement with exptl. measurements.

CC 76-12 (Electric Phenomena)

ST diamond coating silicon molybdenum field emission; dielectrophoresis diamond field **emitter**

IT Simulation and Modeling, physicochemical
Tunneling
(model for effect of diamond **film** thickness on field emission from **coated** silicon and molybdenum)

IT Dielectrophoresis
(of diamond for field **emitters**)

IT **7439-98-7**, Molybdenum, processes **7440-21-3**, Silicon, processes 7782-40-3, Diamond, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(model for effect of diamond film thickness on field emission from coated silicon and molybdenum)

IT **7439-98-7**, Molybdenum, processes **7440-21-3**, Silicon, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(model for effect of diamond film thickness on field emission from coated silicon and molybdenum)

RN 7439-98-7 HCAPLUS

CN Molybdenum (8CI, 9CI) (CA INDEX NAME)

RN 7440-21-3 HCAPLUS

CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

==

L25 ANSWER 10 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1995:765808 HCAPLUS Full-text DN 123:272484

TI Hot electron transport through metal-oxide-semiconductor structures studied by ballistic electron emission spectroscopy

AU Ludeke, R.; Bauer, A.; Cartier, E.

SO Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures (1995), 13(4), 1830-40
CODEN: JVTBD9; ISSN: 0734-211X

AB The tip of a scanning **tunneling** microscope (STM) was used to inject electrons into thin Pt **layers** of metal-oxide- semiconductor (MOS) structures. The **collector** currents emanating from the n-type Si(100) substrates were measured as a function of the electron energy, determined by the STM tip bias VT, for different oxide biases Vox applied independently across the oxide **layers**. The SiO2 **layers** were thermally grown in a device processing line and ranged from 27 to 62 Å in thickness. A current threshold near VT = 3.90 V is interpreted in terms of current transport through the SiO2 conduction band. The current transport through the MOS structure was modeled in a single band description for zero oxide thickness, and fitted to the **collector** currents that had been corrected for impact ionization effects in the Si. Deviations between the 2 curves represent the influence of the transmission probability Tox through the SiO2 **film** of finite thickness. Tox can thus be determined from the exptl. data. Within an eV of threshold the magnitude of Tox is particularly sensitive to small changes in oxide bias in the range 0.3 V ≥ Vox ≥ -0.1 V. The transmission probabilities were also calculated by integrating the Boltzmann equation using Monte Carlo techniques that incorporate energy dependent effective masses and electron phonon scattering rates. Agreement between the 2 approaches is quite good, including the observed sensitivity on oxide bias in the threshold region, which is a direct consequence of the

strong electron-optical phonon scattering in the oxide. The 27 Å thick oxide structures exhibited in the ballistic electron emission microscopy images scattered patches of high transmittance of only 1-2 nm in extent. The **collector** currents arising from injection at these patches indicated thresholds ≥1.1 eV, but the observed modest currents above that threshold argue against local shorts that would arise from pinholes in the oxide.

CC 76-3 (Electric Phenomena)
Section cross-reference(s): 73

IT **7440-06-4**, Platinum, properties **7440-21-3**, Silicon, properties 7631-86-9, Silica, properties
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(hot electron transport through metal-oxide-semiconductor structures studied by ballistic electron emission spectroscopy)

IT **7440-06-4**, Platinum, properties **7440-21-3**, Silicon, properties
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(hot electron transport through metal-oxide-semiconductor structures studied by ballistic electron emission spectroscopy)

RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 11 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:613345 HCAPLUS Full-text DN 121:213345
TI Probing the CaF2 density of states at Au/CaF2/n-Si(111) interfaces with photoelectron spectroscopy and ballistic-electron emission microscopy
AU Cuberes, M. T.; Bauer, A.; Wen, H. J.; Prietsch, M.; Kaindl, G.
SO Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures (1994), 12(4), 2646-52
CODEN: JVTBD9; ISSN: 0734-211X

AB The electronic properties., chemical, and spatial structure of Au/CaF2/n-Si(111) metal-insulator-semiconductor (MIS) structures, with epitaxially grown CaF2 **layers** of a few monolayers (ML) thickness, were studied by photoelectron spectroscopy, scanning- **tunneling** microscopy, and ballistic-electron emission microscopy. CaF2 **films** on Si are characterized by flat surfaces with defect lines about 500 Å apart; band bending in Si decreases gradually with increasing CaF2 **layer** thickness. Au grows on top of the CaF2 **layer** in the form of hexagonal terraces. A Si segregation to the surface, as observed in case of the bare Au/Si interface, is strongly reduced by the CaF2 intralayer. Ballistic-electron emission microscopy shows a strong influence of the CaF2 d. of states for electron transport through the intralayer. For a 4 ML thick CaF2 intralayer, the position of the CaF2 conduction-band min. is derived from the onset of the **collector** current at 3.3 V. The valence-band offset at the CaF2/Si interface is derived from the valence-band edge observed in photoelectron spectroscopy.

CC 65-3 (General Physical Chemistry)
Section cross-reference(s): 66, 73, 76

IT **7440-21-3**, Silicon, properties **7440-57-5**, Gold, properties 7789-75-5, Calcium fluoride, properties
RL: PRP (Properties)
(electronic properties, chemical, and spatial structure of gold/calcium fluoride/silicon interfaces studied by photoelectron spectroscopy, scanning-tunneling microscopy, and ballistic-electron-emission microscopy)

IT **7440-21-3**, Silicon, properties **7440-57-5**, Gold,

properties
RL: PRP (Properties)
(electronic properties, chemical, and spatial structure of gold/calcium fluoride/silicon interfaces studied by photoelectron spectroscopy, scanning-tunneling microscopy, and ballistic-electron-emission microscopy)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

==

L25 ANSWER 12 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1991:257731 HCAPLUS Full-text DN 114:257731
TI Gold-silicon interface modification studies
AU Hallen, H. D.; Fernandez, A.; Huang, T.; Buhrman, R. A.; Silcox, J.
SO Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures (1991), 9(2, Pt. 2), 585-9
CODEN: JVTBD9; ISSN: 0734-211X
AB Ballistic electron emission microscopy measurements were made for the Au-Si system with and without controlled monolayer impurities at the interface. At moderate sample to scanning **tunneling** microscopy tip biases (<2.5 V) local ballistic, and at high biases (>3 V) the local ballistic transmittance (BT) was modified. The local ballistic transmittance (BT) is the scaling factor of the **collector** current vs. voltage spectra, of the interface. Spatially, the modification typically consists of a region of decreased BT a few hundered Å in diameter surrounded by a ring of increased BT. No change in Schottky barrier height is found. A model is presented which describes the decrease in terms of Au-Si interdiffusion, and the enhancement in terms of a thinning of an impurity **layer** between the Au and Si; connections are made to observations of the unstressed system.
CC 76-3 (Electric Phenomena)
Section cross-reference(s): 66
IT **7440-21-3**, Silicon, properties
RL: PRP (Properties)
(ballistic transmittance in interface of gold with, modification for)
IT **7440-57-5**, Gold, properties
RL: PRP (Properties)
(ballistic transmittance in interface of silicon with, modification of)
IT **7440-21-3**, Silicon, properties
RL: PRP (Properties)
(ballistic transmittance in interface of gold with, modification for)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)
IT **7440-57-5**, Gold, properties
RL: PRP (Properties)
(ballistic transmittance in interface of silicon with, modification of)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

==

L25 ANSWER 13 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1986:636649 HCAPLUS Full-text DN 105:236649
TI Injection capability of MOS **emitters** with **tunnel** oxide **layers** for large current densities
AU Grekhov, I. V.; Ostroumova, E. V.
SO Pis'ma v Zhurnal Tekhnicheskoi Fiziki (1986), 12(19), 1209-12

CODEN: PZTFDD; ISSN: 0320-0116
AB The carrier-injection characteristics were determined of Au-SiO2-Si Schottky tunnel diodes. The recombination luminescence was determined for different c.d. At large c.d., hole injection is highly effective. The results are discussed in terms of the energy levels and barrier tunneling.
CC 76-3 (Electric Phenomena)
IT **7440-57-5,** uses and miscellaneous
RL: USES (Uses)
(Schottky diodes from silica and silicon with, carrier injection from)
IT **7440-21-3,** uses and miscellaneous
RL: PRP (Properties)
(Schottky diodes from, carrier injection properties of)
IT **7440-57-5,** uses and miscellaneous
RL: USES (Uses)
(Schottky diodes from silica and silicon with, carrier injection from)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)
IT **7440-21-3,** uses and miscellaneous
RL: PRP (Properties)
(Schottky diodes from, carrier injection properties of)
RN 7440-21-3 HCAPLUS
CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

===

L25 ANSWER 14 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1974:576892 HCAPLUS Full-text DN 81:176892
TI Adsorption of silicon on molybdenum in a field emission microscope
AU Venkatachalam, G.; Sinha, M. K.
SO Surface Science (1974), 44(1), 157-69
CODEN: SUSCAS; ISSN: 0039-6028
AB The adsorption, surface diffusion, and thermal desorption of Si on Mo were studied by field emission microscopy. The average work function of Si-**covered** Mo field **emitter** decreases with a simultaneous decrease in total field emission current. This suggests resonance **tunneling** of field-emitted electrons. With low **coverage** , boundary free surface diffusion occurs at 565°K on the [111] zones. Above 585°K diffusion occurs with a sharp boundary and an activation energy of 50.9 kcal/mole in the (211)→(100) direction. Adsorption at and above room temperature is anisotropic. The activation energy of thermal desorption from (111) and (411) planes is 63.3 and 123.9 kcal/mole, resp. Annealing the Si-**covered** tip at 1000°K produces a Si enriched surface phase with new crystal planes.
CC 66-5 (Surface Chemistry and Colloids)
Section cross-reference(s): 70
IT **Tunneling**
(resonance, of field-emitted electrons from silicon-**covered** molybdenum)
IT **7439-98-7,** properties
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(adsorption by, of silicon, field-emission microscopy of)
RN 7439-98-7 HCAPLUS
CN **Molybdenum** (8CI, 9CI) (CA INDEX NAME)
IT **7440-21-3,** properties
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(adsorption of, by molybdenum, field-emission microscopy of)
RN 7440-21-3 HCAPLUS
CN **Silicon** (7CI, 8CI, 9CI) (CA INDEX NAME)

==

L25 ANSWER 15 OF 15 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1971:412019 HCAPLUS Full-text DN 75:12019
TI Stimulation of photoelectric emission from semiconductors
AU Borzyak, P. G.
SO Trans. IMEKO (Int. Meas. Confed.) Symp. Photon Detectors, 4th (1970), Meeting Date 1969, 13-28. Editor(s): Jedlicka, Miroslav. Publisher: ARTIA, Prague, Czech.
CODEN: 23EOAD

AB To extend the long wavelength limit of photoelec. emission, known semiconductors with high electron affinity were investigated with regard to the emergence of low energy electrons into vacuum. This may be accomplished either by lowering the work function by means of adsorbed **films** or by stimulation of the photoelec. emission by strong elec. fields. The work function was lowered by ionizing alkali ions on the surface of a semiconductor. This leads to a space charge surface **layer** and a bending of the energy bands. In this case the long wavelength limit of the volume, intrinsic photoemission is determined by the gap. In this way photoemission from GaAs:Cs was obtained with a very large quantum efficiency and a red limit corresponding to the gap. Similar results were obtained for photocathodes of the InP-Cs-O type. Heating the photoconductive electrons inside the semiconductor to the degree that they would be able to emerge into vacuum is demonstrated for CdS. This hot electron **emitter** has a quantum efficiency of 0.55 electron per photon at λ = 750 nm. Stimulation of photoelec. emission by strong elec. fields is possible for biased p-n junction semiconductors. Cs-doped Si and Ge junctions are referred to in this regard, as are various thin **film** structures, such as Al-Al2O3-Au, which are characterized by low quantum efficiency. Best results are obtained with **tunnel** photocathodes with a strong external field penetrating the **emitter** .

CC 71 (Electric Phenomena)
IT 1303-00-0, properties 1306-23-6, properties **7440-21-3**, properties 7440-56-4, properties 22398-80-7
RL: TEM (Technical or engineered material use); USES (Uses)
(photocathodes, photoelec. effect stimulation in, by surface ionization of alkali metals)
IT **7440-57-5**, properties
RL: TEM (Technical or engineered material use); USES (Uses)
(photoelec. effect stimulation in aluminum-aluminum oxide-gold film structure photocathodes, by surface ionization of alkali metals)
IT **7440-21-3**, properties
RL: TEM (Technical or engineered material use); USES (Uses)
(photocathodes, photoelec. effect stimulation in, by surface ionization of alkali metals)
RN 7440-21-3 HCAPLUS
CN **Silicon** (7CI, 8CI, 9CI) (CA INDEX NAME)
IT **7440-57-5**, properties
RL: TEM (Technical or engineered material use); USES (Uses)
(photoelec. effect stimulation in aluminum-aluminum oxide-gold film structure photocathodes, by surface ionization of alkali metals)
RN 7440-57-5 HCAPLUS
CN **Gold** (8CI, 9CI) (CA INDEX NAME)

L30 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:592491 HCAPLUS Full-text DN 135:324482
TI Metal Atoms and Particles on Oxide Supports: Probing Structure and Charge by Infrared Spectroscopy
AU Frank, Martin; Baeumer, Marcus; Kuehnemuth, Ralf; Freund, Hans-Joachim
SO Journal of Physical Chemistry B (2001), 105(36), 8569-8576
CODEN: JPCBFK; ISSN: 1089-5647
AB Supported metal particles may exhibit properties fundamentally different from the corresponding bulk materials. To gain insight into principles underlying size- and structure-dependent phenomena, a structural characterization of small aggregates at the atomic level is crucial, while far from straightforward. A long-standing question in the study of supported **clusters** and **metal-oxide** interfaces concerns the extent of metal-oxide charge transfer. It is shown that IR spectroscopy, utilizing carbon monoxide as a probe mol., may provide valuable information on both structure and charge of ultrasmall metal aggregates and single metal atoms. To create supported particles containing only few atoms or even a single atom, submonolayer amts. of the transition metals palladium, rhodium, and iridium were vapor-deposited onto a thin, well-ordered alumina **film** at low substrate temps. Scanning **tunneling** microscopy served to characterize nucleation behavior and average particle size. Sharp, discrete features in the IR spectra of adsorbed CO are due to uniform metal (M) carbonyls, most notably the mono- and dicarbonyl species MCO and M(CO)2. The thermal behavior of such carbonyls is reflected in the thermal evolution of their IR signatures. Comparing the C-O stretching frequencies of MCO species on the aluminum oxide **film** to those of their matrix-isolated neutral and charged counterparts, the charge of the metal centers is estimated In this way, the extent of metal-oxide charge transfer at point defects and regular sites of the alumina **film** is shown to be smaller than ±0.2 elementary charges. By contrast, Rh atoms more strongly bound to oxide line defects are oxidized by the alumina substrate.

==

L30 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:302892 HCAPLUS Full-text DN 134:286067
TI Modeling heterogeneous catalysts: **metal clusters** on planar **oxide** supports
AU Chusuei, C. C.; Lai, X.; Luo, K.; Goodman, D. W.
SO Topics in Catalysis (2001), Volume Date 2000, 14(1-4), 71-83
CODEN: TOCAFI; ISSN: 1022-5528
AB A review with 104 refs.; model catalysts consisting of Au and Ag clusters of varying size have been prepared on single crystal TiO2(110) and ultra-thin **films** of TiO2, SiO2 and Al2O3. The morphol., electronic structure, and catalytic properties of these Au and Ag clusters have been investigated using low-energy ion scattering spectroscopy (LEIS), temperature-programmed desorption (TPD), XPS and scanning **tunneling** microscopy (STM) and spectroscopy (STS) with emphasis on the unique properties of clusters <5.0 nm in size. Motivating this work is the recent literature report that gold supported on TiO2 is active for various reactions including low-temperature CO oxidation and the selective oxidation of propylene. These studies illustrate the novel and unique phys. and chemical properties of nanosized supported metal .
CC 67-0 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)
ST modeling heterogeneous catalyst **metal cluster** planar **oxide** support review
IT Clusters
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)
(metal; modeling heterogeneous catalysts of **metal clusters** on planar **oxide** supports)
IT Catalysts

Electronic structure
Nanoparticles
Oxidation catalysts
Surface structure
(modeling heterogeneous catalysts of **metal clusters** on planar **oxide** supports)

IT Oxides (inorganic), uses
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)
(modeling heterogeneous catalysts of **metal clusters** on planar **oxide** supports)

==

L30 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:893044 HCAPLUS Full-text DN 134:33371
TI Structure-reactivity correlations for oxide-supported metal catalysts: new perspectives from STM
AU Lai, X.; Goodman, D. W.
SO Journal of Molecular Catalysis A: Chemical (2000), 162(1-2), 33-50
CODEN: JMCCF2; ISSN: 1381-1169
AB A review with 94 refs.; deposition of metals onto planar oxide supports provides a convenient methodol. for modeling important aspects of supported metal catalysts. In this work, scanning **tunneling** microscopy (STM), in conjunction with traditional surface-science techniques, is used to monitor the morphol. changes of **oxide** -supported **metal clusters** upon exposure to reactants at elevated pressures. Of special concern is the relationship between catalytic activity/selectivity and surface structure, e.g., metal-support interaction and intrinsic cluster size effects. Au and Ag clusters were vapor-deposited onto TiO2(110) under ultrahigh vacuum (UHV) conditions. Characterization of cluster size and d. as a function of metal **coverage** is correlated with catalytic reactivity. Oxygen-induced cluster ripening occurs upon exposure of Au/TiO2(110) and Ag/TiO2(110) to 10.00 Torr O2. The morphol. of the metal clustering induced by O2 exposure implies the chemisorption of O2 onto the metal clusters and the TiO2 substrate at room temperature Ag and Au clusters exhibited a bimodal size distribution following O2 exposure due to Ostwald ripening, i.e., some clusters increased in size while other clusters shrank. A volatile oxide species is proposed to form at high oxygen pressures, accelerating intercluster atom transport. The oxide substrate was found to play a role in the kinetics of cluster ripening. STM shows that **oxide** -supported **metal clusters** are very reactive to O2 and that nanoclusters are particularly susceptible to adsorbate-induced restructuring.

==

L30 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:665114 HCAPLUS Full-text DN 133:228544
TI Metal nanoclusters supported on metal oxide thin films: bridging the materials gap
AU St. Clair, Todd P.; Goodman, D. Wayne
SO Topics in Catalysis (2000), 13(1,2), 5-19
CODEN: TOCAFI; ISSN: 1022-5528
AB A review with 74 refs.; characterization and reactivity studies were performed on model catalysts comprised of metal **clusters** supported on **metal oxide** thin **films**. The thin **films** are prepared by vaporizing the parent metal onto a refractory metal substrate in an O2 environment. The oxide **films** are sufficiently conductive via defects and **tunneling** to the substrate that the use of charged particle spectroscopies does not lead to any adverse charging effects. Numerous characterization techniques demonstrated that both spectroscopically and chemical these thin **films** are comparable to the

analogous bulk metal oxides. Model supported catalysts were subsequently prepared by vapor-depositing catalytically-interesting metals onto these thin **film** oxide supports. This deposition method realizes tight control over cluster size and, therefore, represents an ideal approach to studying size-dependent chemical and phys. properties. Reactivity studies established the validity of the supported systems as models of conventional catalysts. Furthermore, the use of these model catalysts provides a bridge between fundamental studies of single crystal reactivities and applied studies of high-surface-area catalyst activities.

===

L30 ANSWER 5 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:563104 HCAPLUS Full-text DN 131:305920
TI Tunneling in a double-barrier system and its practical implications for field ionization and field emission
AU Knor, Z.
SO Ultramicroscopy (1999), 79(1-4), 1-10
CODEN: ULTRD6; ISSN: 0304-3991
AB The relation between the chemical bond formation and **tunneling** phenomena in general, and the relation between the field ionization of inert gases and the chemical reactivity of metallic surfaces in particular, are discussed in terms of a double-barrier model of the field ionization. Within the framework of this model, resonance-enhanced **tunneling** is used to elucidate (i) the visibility of only those atoms which are located at the edges of densely populated atomic **layers** (in contrast to the STM images, where no such effect occurs); (ii) the visibility of outer **metallic clusters** deposited on **oxide layers** in MOM systems. Also, some results of FIM and STM studies cannot be understood on the basis of 1-dimensional models, in spite of the wide and successful use of essentially 1-dimensional approaches in the theor. treatment of **tunneling** phenomena.
IT Clusters
(visibility of outer **metallic clusters** deposited on **oxide** layers in MOM systems)
IT Oxides (inorganic), properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(visibility of outer **metallic clusters** deposited on **oxide** layers in MOM systems)

===

L30 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:354693 HCAPLUS Full-text DN 129:9083
TI **Metal clusters** on ultrathin **oxide** films: model catalysts for surface science studies
AU Rainer, D. R.; Goodman, D. W.
SO Journal of Molecular Catalysis A: Chemical (1998), 131(1-3), 259-283
CODEN: JMCCF2; ISSN: 1381-1169
AB A review with 97 refs.; characterization and reaction kinetics studies have been performed over a variety of planar model supported catalysts prepared by the vapor deposition of catalytically interesting metals onto ultrathin oxide **films** on refractory metal single crystal substrates in ultrahigh vacuum. These unique systems feature many of the advantages for fundamental study associated with single crystals, while addressing important issues for supported catalysts, such as the intrinsic effects of particle size and the role of the support. The oxide thin **films** have been shown to roughly mimic the chemical and phys. properties of the bulk analogs, and yet they are elec. conductive via defects and **tunnelling** to the single crystal substrate. This

renders them amenable to the various charged particle spectroscopies that comprise the core of modern surface science; also, because they are flat as well conductive, they are suitable for scanning-**tunnelling** and atomic force microscopy. Characterization studies carried out over these models focusing on structural, electronic, and chemical properties as a function of particle size have been related to parallel studies of relevant catalytic reactions, providing fundamental insight into these processes at the atomic level. The select group of expts. presented here provides a broad illustration of the versatility and utility of these materials for elucidating the properties of small, supported metal particles and for simulating catalysis over 'real world' high surface area supported catalysts.

ST **metal cluster** ultrathin **oxide** film review; model catalyst surface science review

IT **Oxides** (inorganic), uses
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)
(**metal clusters** on ultrathin **oxide** films and model catalysts for surface science studies)

IT Clusters
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)
(**metal; metal clusters** on ultrathin **oxide** films and model catalysts for surface science studies)

L30 ANSWER 7 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1996:456259 HCAPLUS Full-text DN 125:129746

TI Electron Transfer in Self-Assembled Inorganic Polyelectrolyte/Metal Nanoparticle Heterostructures

AU Feldheim, Daniel L.; Grabar, Katherine C.; Natan, Michael J.; Mallouk, Thomas E.

SO Journal of the American Chemical Society (1996), 118(32), 7640-7641
CODEN: JACSAT; ISSN: 0002-7863

AB **Multilayer** thin **films** of inorg. anionic **sheet** compds. (α-Zr(HPO4)2·H2O, HTi2NbO7), the polyelectrolyte cation poly(allylamine hydrochloride) and nanoscopic Au clusters (1.4 nm, 2.5 nm and 12 nm diameter) were assembled from aqueous solns. onto conductive supports via sequential ion exchange reactions. Control of the **layering** sequence yields metal-insulator-nanocluster-insulator-metal devices. These devices display electronic properties characteristic of ultrasmall-capacitance **tunnel** junctions (.apprx.10-18 farads); a high impedance plateau centered at 0 V (the Coulomb gap) is observed in the current-voltage curve. The voltage range of the impedance gap can be tuned by changing the thickness of the insulating **films** that sandwich the Au clusters. Importantly, the devices were assembled entirely from wet chemical methods. This bench-top **multilayer** thin **film** growth technique described within may provide an easily accessible, inexpensive route to interesting electronic devices such as single electron transistors.

IT Electric impedance
(fabrication and properties of inorg. polyelectrolyte, polymer polyelectrolyte and gold **cluster** structure as **metal** -**insulator**-nanocluster-**insulator**-metal devices)

IT 7440-57-5, Gold, processes 13933-56-7, Zirconium phosphate (Zr(HPO4)2) monohydrate 71550-12-4, Poly(allylamine hydrochloride)
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(fabrication and properties of inorg. polyelectrolyte, polymer polyelectrolyte and gold **cluster** structure as **metal** -**insulator**-nanocluster-**insulator**-metal devices)

L30 ANSWER 9 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1995:751882 HCAPLUS Full-text DN 123:271836
TI Conductance resonance of coupled supported metal clusters
AU Chen, Xiaoshuang; Zhao, Jijun; Lui, Fengqi; Sun, Qing; Wang, Guanghou
SO Physics Letters A (1995), 204(3,4), 291-4
CODEN: PYLAAG; ISSN: 0375-9601
AB The conductance resonance of a **tunneling** structure with a few metal clusters, deposited on an insulating **film**, was studied by the generalized Breit-Wigner formula in a tight-binding approximation In the conductance resonance the multiple peak structure comes from the interaction between supported **metal clusters** on an **insulating film** and the different arrangements of metal clusters can cause a difference of the conductance resonance peaks. Therefore it is possible to predict the effect of the interaction between metal clusters on the conductance resonance and develop some new microelectronic devices by artificially arranging metal clusters on the surface of the insulating **film**.
CC 76-1 (Electric Phenomena)

L30 ANSWER 10 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1992:602986 HCAPLUS Full-text DN 117:202986
TI Dielectric properties of gold-containing plasma-polymerized thin films
AU Canet, P.; Laurent, C.; Akinnifesi, J.; Despax, B.
SO Journal of Applied Physics (1992), 72(6), 2423-31
CODEN: JAPIAU; ISSN: 0021-8979
AB Elec. properties of gold-containing plasma-polymerized thin **films** have been studied in the dielec. regime (isolated conducting clusters dispersed in a polymeric matrix). DC measurements over a wide temperature range provide evidence for a transport process involving the matrix itself as opposed to **tunneling** directly across the **insulating** barrier between **metallic clusters**. The **films** display space-charge-limited conduction which is due to the existence of trap states in the polymeric phase. An exponential distribution of traps with a peak value of the order of 1017 cm-3eV-1 has been deduced from the voltage-current data. The AC behavior is dominated by conduction losses at low frequency with a dissipation peak due to interfacial polarization between metal and matrix in the kHz range. Another relaxation is found for gold-rich **films**. Full interpretation requires more details on the polymeric phase which composition, and elec. properties change gradually with increasing gold concentration
CC 76-10 (Electric Phenomena)
Section cross-reference(s): 36

L31 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:62201 HCAPLUS Full-text DN 128:122602
TI Manufacturing a single-electron transistor by using scanning tunneling microscopy
IN Park, Kang-Ho; Ha, Jeong-Sook; Lee, El-Hang
PA Electronics and Telecommunications Research Institute, S. Korea

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5710051	A	19980120	US 1996-694316	19960808

PRAI KR 1995-53661 19951221
AB A method for the manufacture of a single-electron transistor (SET) in a vacuum state, where the SET operates at room temperature, comprises the steps of: approaching a Au tip of a scanning **tunneling** microscope (STM) on top of a Si substrate having a Si oxide **layer** on it to maintain a distance from the top of the oxide **layer** to the end of the Au tip of the STM; forming a Au cluster on top of the oxide **layer** by using a low-field evaporation method employing the STM, thereby forming a 2-dimensional island structure on top of the oxide **layer**, where the low-field evaporation method employing the STM generates an electron pulse between the top of the oxide **layer** and the end of the Au tip of the STM by applying a voltage to the Au tip; forming a source and a drain on either side of the Au cluster in the 2-dimensional island structure in such a way that the Au cluster maintains a gap with the source and the drain, thereby forming an electron **tunneling** barrier on the right and left of the Au cluster; and forming a gate on the bottom of the substrate.
IC ICM H01L021-00
NCL 437007000
CC 76-3 (Electric Phenomena)
IT Clusters
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**metal**; forming gold **clusters** on Si **oxide** by scanning tunneling microscopy in manufacture of a single-electron transistor)
IT 7631-86-9, Silica, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacturing a single-electron transistor by using scanning **tunneling** microscopy on silicon substrate **coated** with)

L41 ANSWER 1 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:482164 HCAPLUS Full-text DN133:200562
TI Light emission and detection by metal oxide silicon tunneling diodes
AU Liu, C. W.; Lee, M. H.; Lin, C. F.; Lin, I. C.; Liu, W. T.; Lin, H. H.
SO Technical Digest - International Electron Devices Meeting (1999) 749-752
CODEN: TDIMD5; ISSN: 0163-1918
AB Both NMOS and PMOS light-emitting diodes and photodetectors are demonstrated. For the ultrathin gate oxide, the **tunneling** gate of metal oxide Si (**MOS**) diodes can be used as both **emitters** for light emitting devices and **collectors** for light detectors. An electron-hole plasma model was used to fit the emission spectra. A surface band bending is responsible for the bandgap reduction in electroluminescence (EL) from the **MOS tunneling** diode. The dark current of the photodetectors is limited by the thermal generation of minority carrier in the inversion **layer**. The high growth temperature(1000°) of the oxide can reduce the dark current to a level ≥3 nA/cm2.
ST LED photodiode **MOS** silicon; fabrication tunneling diode
IT **Annealing**
Photolithography
(in fabrication of electroluminescent and optical detecting **MOS** diodes)
IT Electroluminescent devices
Luminescence, electroluminescence
MOS devices
Optical detectors
Tunnel diodes
(light emission and detection by metal oxide silicon tunneling diodes)
IT Oxidation
(thermal; in fabrication of electroluminescent and optical detecting **MOS** diodes)
IT 7429-90-5, Aluminum, uses 50926-11-9, ITO
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in fabrication of electroluminescent and optical detecting **MOS** diodes)
IT **7440-21-3**, Silicon, uses 7631-86-9, Silica, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(light emission and detection by metal oxide silicon tunneling diodes)

==

L41 ANSWER 2 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:398562 HCAPLUS Full-text DN131:109782
TI Quasiballistic electron emission from porous silicon diodes
AU Koshida, N.; Sheng, X.; Komoda, T.
SO Applied Surface Science (1999), 146(1-4), 371-376
CODEN: ASUSEE; ISSN: 0169-4332
AB Porous Si (PS) diodes operate as efficient cold electron **emitters** as well as electroluminescence (EL) devices. The PS **layers** are formed on the surface of heavily doped n-type Si substrates by conventional photoanodization in an ethanoic HF solution When a pos. bias voltage is applied to the thin **Au** top electrode with respect to the substrate in vacuum, electrons are uniformly emitted through the **Au film**. This is presumably due to **tunneling** of hot electrons generated in PS. An appropriate combination of structural control and thermal oxidation for PS produces quite stable electron emission without any fluctuations or spike noises. The behavior of output electron energy distribution strongly suggests that electrons are emitted quasiballistically. Similar results are also observed in diodes prepared on polycryst. Si **films**.

The elec. function of PS as a ballistic transport medium is discussed, including the advantageous features of this device as a novel electron source.

IT **7440-21-3**, Silicon, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(quasiballistic electron emission from porous silicon diodes)

RN 7440-21-3 HCAPLUS

CN Silicon (7CI, 8CI, 9CI) (CA INDEX NAME)

==

L41 ANSWER 3 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:306019 HCAPLUS Full-text DN131:38234

TI Quantization effects in hole inversion **layers** of **tunnel MOS emitter** transistors on Si (100) and (111) substrates at T = 300 K

AU Shulekin, A. F.; Vexler, M. I.; Zimmermann, H.

SO Semiconductor Science and Technology (1999), 14(5), 470-477
CODEN: SSTEET; ISSN: 0268-1242

AB The 2-dimensional consideration of the hole gas in the inversion **layer** is essential for a correct estimation of the currents flowing in the **tunnel MOS** structure on (100) n-Si and (111) n-Si substrates. The classical (3D) treatment is found to lead to significant errors in the predicted distribution of the applied voltage, which results in incorrect evaluation of currents and makes the performance of a careful anal. of the energy relaxation of injected hot electrons impossible. A complete quantum treatment for an inversion should be based on the self-consistent solution of Poisson-Schroedinger equations, as is done for MOSFETs. The hole **tunnel** current is to be calculated as a sum of currents from discrete levels. A simplified quantum approximation is also examined for the **tunnel MOS** structure. The quantization effects are important in almost all practically interesting operational modes, especially for high insulator bias and high doping concentration

ST **MOS emitter** transistor silicon substrate quantization

IT Electric current carriers
(concentration; quantization effects in hole inversion **layers** of **tunnel MOS emitter** transistors on Si (100) and (111) substrates)

IT Fermi level
Hole (electron)
Hot electrons
MOS devices
MOSFET (transistors)
Quantization
Transistors
Valence band
(quantization effects in hole inversion **layers** of **tunnel MOS emitter** transistors on Si (100) and (111) substrates)

IT **7440-21-3**, Silicon, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(quantization effects in hole inversion **layers** of **tunnel MOS emitter** transistors on Si (100) and (111) substrates)

==

L41 ANSWER 4 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1997:796755 HCAPLUS Full-text DN128:95132

TI Effect of i-layer parameters on the performance of Si n+-i-n+ homojunction

far-infrared detectors
AU Yuan, Haoxin; Perera, A. G. Unil
SO IEEE Transactions on Electron Devices (1997), 44(12), 2180-2186
CODEN: IETDAI; ISSN: 0018-9383
AB A unified formalism, including space-charge-limited (SCL) conduction, **tunneling**, and the multiple-image-force effect, is developed to perform a complete anal. of Si n+-i-n+ homojunction interfacial work function internal photoemission (HIWIP) FIR detectors. Due to the space-charge effect, the detector performance, such as cutoff wavelength (λc), quantum efficiency (η), dark current (Id), noise equivalent power (NEP), etc., is strongly influenced by the i-**layer** thickness (Wi) and compensating acceptor concentration (Nai) in addition to the **emitter layer** parameters. As a result, the optimum operating conditions of detectors also depend on Wi and Nai. The background limited performance (BLIP) is evaluated, and a critical ITV, value is found for BLIP operation.
ST insulating layer parameter photodetector; silicon homojunction far **IR** detector
IT Optical detectors
(**IR**; effect of i-layer parameters on performance of Si n+-i-n+ homojunction far-**IR** detectors)
IT Electron acceptors
(concentration; effect of i-layer parameters on performance of Si n+-i-n+ homojunction far-**IR** detectors)
IT Band structure
Optimization
Space charge
Tunneling
(effect of i-**layer** parameters on performance of Si n+-i-n+ homojunction far-**IR** detectors)
IT **7440-21-3**, Silicon, uses
RL: DEV (Device component use); USES (Uses)
(effect of i-layer parameters on performance of Si n+-i-n+ homojunction far-**IR** detectors)

===

L41 ANSWER 6 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:18827 HCAPLUS Full-text DN126:68345
TI Suppression of the **emitter** current crowding effect in Auger transistor
AU Belov, S. V.; Veksler, M. I.; Grekhov, I. V.; Shulekin, A. F.
SO Fizika i Tekhnika Poluprovodnikov (Sankt-Peterburg) (1996), 30(10), 1838-1847
CODEN: FTPPA4; ISSN: 0015-3222
AB A suppression of the **emitter** current crowding effect was studied in Auger transistor with a **tunnel MOS emitter** based on Al/SiO2/n-Si structure. The homogenization of the potential of an induced base along the **emitter** area occurs through the activation of an intrinsic source of minority carriers - Auger ionization that is caused by injected electrons. For a quant. explanation of the observed effects, the hole mobility in inversion **layer** in **tunnel** structures probably is lower than that in blocking **MOS** devices. The homogenization of the base potential due to Auger process revealed both in d.c. and a.c. characteristics of the Auger transistor. The conditions for observation of the suppression of **emitter** crowding, in particular the effect of **collector** voltage, are discussed.
ST Auger **MOS** transistor suppression **emitter** crowding; aluminum silica silicon Auger transistor
IT **MOS** transistors
(Auger; suppression of **emitter** current crowding effect in Auger transistor)

IT Tunneling
(suppression of **emitter** current crowding effect in Auger transistor)
IT 7429-90-5, Aluminum, uses **7440-21-3**, Silicon, uses 7631-86-9, Silica, uses
RL: DEV (Device component use); USES (Uses)
(suppression of **emitter** current crowding effect in Auger transistor)
IT **7440-21-3**, Silicon, uses
RL: DEV (Device component use); USES (Uses)
(suppression of **emitter** current crowding effect in Auger transistor)

===

L41 ANSWER 7 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:764035 HCAPLUS Full-text DN126:68322
TI Impact of polysilicon **emitter** interfacial layer engineering on the 1/f noise of bipolar transistors
AU Simoen, Eddy; Decoutere, Stefaan; Cuthbertson, Alan; Claeys, Cor L.; Deferm, Ludo
SO IEEE Transactions on Electron Devices (1996), 43(12), 2261-2268
CODEN: IETDAI; ISSN: 0018-9383
AB To optimize the elec. characteristics of polysilicon **emitter** bipolar transistors, the poly **emitter** interface needs careful engineering. Bipolar transistors of a 0.5 μm BiCMOS process were fabricated with intentionally grown oxides in an LPCVD cluster for precise control over the interfacial oxide thickness and uniformity. The trade off between current gain enhancement and increase 1/f noise is discussed for various interfacial oxide thicknesses and **emitter** annealing conditions. It will be demonstrated that for sufficiently large base currents, both for large (20 μm + 20 μm) and small (0.5 μm + 5 μm) **emitter** areas the interfacial oxide dominates the 1/f noise spectrum of the base current. Hence, the polysilicon **emitter** interface engineering will not only set the current gain at a predefined value, but at the same time the associated oxide-tunneling noise is fixed, within the constraint that the **emitter**-base junction depth is constant Finally, the current gain enhancement and increased 1/f noise have compensating effects on the output noise of practical circuits.
ST silicon bipolar complementary **MOS** transistor noise; interface noise silica silicon transistor; polysilicon **emitter** noise transistor
IT Vapor deposition process
(chemical; impact of polysilicon **emitter** interfacial layer engineering on 1/fluorine noise of bipolar transistors)
IT **Annealing**
Bipolar transistors
Electric noise
Interfacial structure
MOS transistors
Tunneling
(impact of polysilicon **emitter** interfacial **layer** engineering on 1/fluorine noise of bipolar transistors)
IT Thickness
(silica layer; impact of polysilicon **emitter** interfacial layer engineering on 1/fluorine noise of bipolar transistors)
IT **7440-21-3**, Silicon, properties 7631-86-9, Silica, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical

process); PRP (Properties); PROC (Process); USES (Uses)
(impact of polysilicon **emitter** interfacial layer engineering on 1/fluorine noise of bipolar transistors)

===

L41 ANSWER 8 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:549357 HCAPLUS Full-text DN125:288200
TI Radiation hard blocked tunneling band GaAs/AlGaAs superlattice long wavelength infrared detectors
AU Wu, C. S.; Wen, C. P.; Reiner, P.; Tu, C. W.; Hou, H. Q.
SO Solid-State Electronics (1996), 39(9), 1253-1268
CODEN: SSELA5; ISSN: 0038-1101
AB The authors developed a multiquantum well (MQW) long wavelength **IR** (LWIR) detector which can operate in a photovoltaic detection mode with an intrinsic event discrimination (IED) capability. The detector was constructed using GaAs/AlGaAs MQW technol. to form a blocked **tunneling** band superlattice structure with a 10.2 μ wavelength and 2.2 μ bandwidth. The detector exhibited Schottky junction and photovoltaic detection characteristics with extremely low dark current and low noise as a result of a built-in **tunneling** current blocking **layer** structure. In order to enhance quantum efficiency, a built-in elec. field was created by grading the doping concentration of each quantum well in the MQW region. The peak responsivity of the detector was 0.4 amps/W with a measured detectivity of 6.0 + 1011 Jones. The external quantum efficiency was measured to be 4.4%. The detector demonstrated an excellent intrinsic event discrimination capability due to the presence of a p-type GaAs hole **collector layer,** which was grown on top of the n-type electron **emitter** region of the MQW detector. The best results show that an **IR** signal which is as much as 100 times smaller than coincident nuclear radiation-induced current could be distinguished and extracted from the noise signal. With this hole **collector** structure, our detector also demonstrated two-color detection.
IT **7440-21-3,** Silicon, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(radiation-hard blocked tunneling band gallium arsenide/aluminum gallium arsenide superlattice long wavelength **IR** detectors)

===

L41 ANSWER 9 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:396269 HCAPLUS Full-text DN125:262466
TI STM-contact with surface passivated by hydrogen of N-type silicon as point Auger-transistor with tunnel **MOS-emitter**
AU Bolotov, L. N.; Makarenko, I. V.; Titkov, A. N.; Veksler, M. I.; Grekhov, I. V.; Shulekin, A. F.
SO Fizika Tverdogo Tela (Sankt-Peterburg) (1996), 38(3), 889-900
CODEN: FTVTAC; ISSN: 0367-3294
AB A transistor regime can be realized in a reverse biased contact of STM with n-Si surface passivated by H. This effect is due to accumulation of holes in a near-surface **layer** of Si. Irradiation of the STM contact allows one to control the electron injection into conduction band by changing the hole concentration near the surface. For high bias, the injection of hot electrons takes place. This induces Auger-ionization in Si which leads to bistability of the STM contact. STM contact with semiconductor surface can be considered a point model of a **tunnel MOS** -structure.
IT **7440-21-3D,** Silicon, hydrogenated
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(study of processes in STM contact with n-Si surface passivated by H)

=====

L41 ANSWER 11 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:713060 HCAPLUS Full-text DN121:313060
TI Simple model for the Auger transistor
AU Ostroumova, E. V.; Rogachev, A. A.
SO Fizika i Tekhnika Poluprovodnikov (Sankt-Peterburg) (1994), 28(8), 1411-23
CODEN: FTPPA4; ISSN: 0015-3222
AB A quasi-classical model of the Auger transistor based on a **MOS** structure with **tunnel**-transparent oxide **layer** (Al- SiO2- n-Si) is created. The transistor has a double **layer emitter** and a quantum dimensional base induced by elec. field. The injected electrons receive a substantial part of their energy (up to 0.7 eV) from heating during their passing over the quantum selfconsistent hole well on the silicon surface. Thus the impact ionization threshold can be obtained with lower potential drop across the oxide. The quantum well depth is calculated in the frame of the Hartree approximation with exchange and correlation corrections taken into account. Electron and hole **tunneling** currents are calculated in quasi-classical approximation The I-V characteristics of the Auger transistor were calculated assuming the energy of electrons depends on the impact ionization coefficient The theor. I-V characteristics of the Auger transistor are in good agreement with experiment data.
IT 7429-90-5, Aluminum, uses **7440-21-3**, Silicon, uses 7631-86-9, Silica, uses
RL: DEV (Device component use); USES (Uses)
(simple model for Auger transistor with **tunnel**-transparent oxide **layer**)
IT **7440-21-3**, Silicon, uses
RL: DEV (Device component use); USES (Uses)
(simple model for Auger transistor with **tunnel**-transparent oxide **layer**)

=====

L41 ANSWER 12 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1991:420234 HCAPLUS Full-text DN115:20234
TI Internal field emission of microelectronics MIS structures
AU Litovchenko, V. G.; Lisovskii, I. P.; Popov, V. G.
SO Surface Science (1991), 246(1-3), 69-74
CODEN: SUSCAS; ISSN: 0039-6028
AB High field effects in special (UV treated, with graded-band-gap insulating **layer** multitips) MIS structures are considered. These structures have low interface barriers or high internal contact elec. fields. A superposition of internal and addnl. external fields leads to a release of mobile ions, in particular protons. The dependence of the emission current on the properties of MIS structures and field strength are studied. The Poole-Frenkel mechanism is responsible for the ionic component of the emission current. A new method for studying the kinetic characteristics of the internal electron emission taking into account carrier trapping processes has been developed. This technique makes it possible to determine the carrier effective masses as well as the interface barrier heights in MIS structures containing graded band-gap SiOxNy or other complex **layers**. The last part of the report is dedicated to field photoemission in MIS structures with **emitter** arrays containing **tunnel**-thin insulator **films** and a Schottky barrier. Along with Fowler-Nordheim photoemission, an anomalous photocurrent of the opposite polarity (**IR** photocurrent) has been observed
IT **7440-21-3**, Silicon, properties
RL: PRP (Properties)
(field emission from tips of, effect of silicon nitrate overlayer on

increase of current and decrease of work function in)

==

L41 ANSWER 13 OF 13 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1990:28808 HCAPLUS Full-text DN112:28808

TI Silicon/silicon oxide/silicon (Si/SiOx/Si) hole-barrier fabrication for bipolar transistors using molecular beam deposition

AU Tatsumi, Toru; Niino, Taeko; Sakai, Akira; Hirayama, Hiroyuki

SO Japanese Journal of Applied Physics, Part 2: Letters (1989), 28(10), L1678-L1681
CODEN: JAPLD8; ISSN: 0021-4922

AB SiOx **layers** were deposited on Si substrates in a Si MBE system by codeposition of Si and O2. The oxygen concentration increased as the deposition temperature decreased and approached the results of SiO2 stoichiometry. O2 pressure was 5 + 10-5 torr, and the Si deposition rate was 0.2 Å/s. Composition was determined by using XPS and Auger electron spectroscopy, and the elec. properties of its **MOS** capacitor were measured. The growth procedure used here offers high controllability in the thickness of the deposited SiOx **layer** and permits subsequent Si growth in the same Si-MBE chamber. Such Si/SiOx/Si structures, which may be applied to the hole-barrier between the base and **emitter layers** in a bipolar transistor, were also successfully grown using this method. The **tunneling** currents for electrons and holes in such structures with SiOx thickness 5-60 Å were measured. One-order-larger **tunneling** currents for electrons than those for holes were measured at the same SiOx thickness above 30 Å.

IT **7440-21-3**, Silicon, uses and miscellaneous
RL: USES (Uses)
(transistors of, hole-barrier fabrication for bipolar, by MBE of silicon oxide)

L42 ANSWER 1 OF 7 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:348747 HCAPLUS Full-text DN138:330295
TI Method of making an **emitter** with variable density photoresist layer
IN Ramamoorthi, Sriram; Chen, Zhizhang
PA Hewlett-Packard Development Company, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6558968	B1	20030506	US 2001-2422	20011031
	JP 2003141984	A2	20030516	JP 2002-304828	20021018
	EP 1308980	A2	20030507	EP 2002-257304	20021022
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK				
	CN 1426082	A	20030625	CN 2002-148148	20021031

AB An **emitter** has an electron supply **layer** and a **tunneling layer** formed on the electron supply **layer**. Optionally, an insulator **layer** is formed on the electron supply **layer** and has openings defined within in which the **tunneling layer** is formed. A cathode **layer** is formed on the **tunneling layer**. A conductive **layer** is partially disposed on the cathode **layer** and partially on the insulator **layer** if present. The conductive **layer** defines an opening to provide a surface for energy emissions of electrons and/or photons. Preferably but optionally, the **emitter** is subjected to an annealing process thereby increasing the supply of electrons **tunneled** from the electron supply **layer** to the cathode **layer**.
IC ICM H01L021-00
NCL 438020000; 445051000
CC 76-12 (Electric Phenomena)
ST electron **emitter** variable density photoresist layer
IT Photoresists
(electron **emitter** with variable d. layer of)
IT Electric insulators
(in electron **emitter** with variable d. photoresist layer)
IT **Tunneling**
(**layer** in electron **emitter** with variable d. photoresist **layer**)
IT **Annealing**
(of electron **emitter** with variable d. photoresist layer)
IT 7439-88-5, Iridium, uses 7439-98-7, **Molybdenum**, uses 7440-06-4, **Platinum**, uses 7440-18-8, **Ruthenium**, uses 7440-25-7, **Tantalum**, uses 7440-57-5, **Gold**, uses
RL: DEV (Device component use); USES (Uses)
(cathode layer in electron **emitter** with variable d. photoresist layer)
IT 409-21-2, Silicon monocarbide, uses 1314-61-0, **Tantala** 11139-79-0, Aluminum **tantalum** oxide 12033-89-5, Silicon nitride, uses 12633-97-5, Aluminum nitride oxide 13463-67-7, Titania, uses 39345-87-4, Silicon carbide oxide 108729-83-5, Tungsten nitride silicide 116305-88-5, Silicon fluoride oxide 157781-72-1, Aluminum nitrogen **tantalum** oxide
RL: DEV (Device component use); USES (Uses)
(**tunneling layer** in electron **emitter** with variable d. photoresist **layer**)

L42 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:227166 HCAPLUS Full-text DN132:259393
TI Manufacture of field-emission electron source
IN Komota, Takuya; Koshida, Nobuyoshi

PA Matsushita Electric Works, Ltd., Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000100319	A2	20000407	JP 1998-271876	19980925
	JP 3079086	B2	20000821		

AB The electron source, using Si semiconductor **layer**, a porous oxide **layer**, and a metal **layer**, is manufactured by the simple process. The source shows stable emission in high efficiency and is suitable for electrooptical display device. Porous and oxidized poly-Si **layers**, which are prepared by anodizing a non-doped poly-Si **film** and oxidizing by RTO (rapid thermal oxidation), are formed on the main surface of a n-type Si substrate. An electrode (e.g., an **Au film**) is formed on the porous oxidized poly-Si **layer**, and another electrode is formed on the back of the n-type Si substrate. When voltage is supplied between the electrodes, electrons are injected from the n-type Si substrate to the porous oxidized poly-Si **layer**, and the electrons are emitted from the **Au film** by the so-called **tunnel** effect.

IC ICM H01J009-02

CC 76-12 (Electric Phenomena)
Section cross-reference(s): 74

ST field emission electron source silicon semiconductor; display device field emission electron source; rapid thermal oxidn porous silica **emitter**

IT **Annealing**
(for thermal oxidation; in manufacture of field-emission electron source comprising silicon semiconductor layer, porous oxide layer, and metal thin film)

IT Field **emitters**
Semiconductor materials
(manufacture of field-emission electron source comprising silicon semiconductor layer, porous oxide layer, and metal thin film)

L42 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1998:655993 HCAPLUS Full-text DN129:309703

TI Electron-emitting devices

IN Yoshikawa, Takamasa; Ogasawara, Kiyohide; Ito, Hiroshi; Yamaguchi, Masataka; Iwasaki, Shingo; Negishi, Nobuyasu; Nakauma, Takashi

PA Pioneer Electronic Corp., Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10269932	A2	19981009	JP 1997-71864	19970325
	US 5990605	A	19991123	US 1998-44819	19980320
	EP 874384	A1	19981028	EP 1998-105240	19980323
	EP 874384	B1	20030312		

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO

AB The device has an electron-supply semiconductor layer, a porous semiconductor intermediate layer which consists of ≥2 porous layers different in porosity from each other in the thickness direction, and a metal film electrode facing a vacuum space for emission by application of a field between the semiconductor layer and the film electrode with increased emission efficiency. The porous layers may be prepared by anodization of the surface layer of the semiconductor layer with processing periods of changed c.d. for a cold emission device.

IC ICM H01J001-30
ICS H01J001-30; H01L033-00

CC 76-12 (Electric Phenomena)
Section cross-reference(s): 73, 74

ST porous semiconductor film electrode electron **emitter**
IT Semiconductor materials
(electron-supplying, porous; having planar electron **emitters** with porous semiconductor intermediate layers)
IT Anodization
(for formation of porous semiconductor intermediate layers in preparation of
planar electron **emitters**)
IT Film electrodes
(for planar electron **emitters** with porous semiconductor intermediate layers)
IT Electrodes
Electroluminescent devices
Electrooptical imaging devices
(having planar electron **emitters** with porous semiconductor intermediate layers)
IT Field **emitters**
(planar; film **emitter** electrodes on porous semiconductor intermediate layers)
IT **Tunnel** diodes
(porous semiconductor intermediate **layers** and **film** electrodes for planar electron **emitters**)
IT 7440-06-4, **Platinum,** processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(for film electrodes of planar electron **emitters** with porous semiconductor layers)
IT **7440-21-3,** Silicon, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(for porous semiconductor layers of planar electron **emitters** with film electrodes)

L42 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:475876 HCAPLUS Full-text DN127:89684
TI Magnetic devices and magnetic sensors using thereof
IN Mizushima, Koichi; Konno, Teruyuki; Inomata, Koichiro; Yamauchi, Hisashi
PA Toshiba Corp., Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09128719	A2	19970516	JP 1996-189366	19960718
	JP 3217703	B2	20011015		

PRAI JP 1995-225625 19950901
AB The title magnetic sensors have a three terminal device comprising an **emitter,** a base, and a **collector,** wherein the semiconductor **collector layer** and a magnetic **laminated** base **film** make a Schottky junction. The magnetic **laminated** base **film** has an nonmagnetic **film** bound between opposing magnetic **films.** The metallic **emitter film** and base **film** are connected each other via a **tunneling** insulator **film.** The sensors provide variation of current across the magnetic device by magnetization orientation of the magnetic **film** changed by an external magnetic field direction. The devices gives high sensitivity by low c.d.
IC ICM G11B005-39
ICS H01F010-08; H01L029-872; H01L043-08
CC 77-8 (Magnetic Phenomena)
Section cross-reference(s): 76
IT 7440-57-5, **Gold,** properties

RL: DEV (Device component use); PRP (Properties); USES (Uses)
(Schottky film; magnetic devices and magnetic sensors using thereof)
IT **7440-21-3**, Silicon, properties
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(doped semiconductor base; magnetic devices and magnetic sensors using thereof)
IT 7429-90-5, Aluminum, properties
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(**emitter**; magnetic devices and magnetic sensors using thereof)

L42 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:191630 HCAPLUS Full-text DN126:194194
TI MIM/MIS-type electron **emitter** and its manufacture
IN Tazaki, Akira; Iwamoto, Yoji
PA Tazaki Akira, Japan; Dai Nippon Printing Co., Ltd.

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09007499	A2	19970110	JP 1995-171379	19950614

AB The **emitter**, comprising a base-electrode **layer**, a micrograins-packed **layer**, and a top-electrode **layer**, satisfies these conditions: (1) the micrograins comprise a 1st-conductivity-type (semi)conductor (A) **coated** with an insulating **layer**; (2) the top electrode comprises a 2nd-conductivity-type (semi)conductor (B); (3) the insulating **layer** is thin enough for electrons to **tunnel** through; (4) the Fermi level of A is higher than that of B; and (5) the packing d. of the micrograins is controlled so that an elec. current can pass through the **layer** with proper voltage application. The manufacturing process involves evaporation of sources for A and for the insulating **layer** in a chamber to give the micrograins, which are let into another chamber and deposit on a substrate having a base electrode, and deposition of B on it. The as-manufactured electron source shows stable and uniform electron emission.
IC ICM H01J001-30
ICS H01J001-30; H01J009-02
CC 76-12 (Electric Phenomena)
ST electron **emitter** MIM MIS manuf
IT Vapor deposition process
(in manufacture of MIM/MIS-type electron **emitter** with stable characteristics)
IT Cathodes
(manufacture of MIM/MIS-type electron **emitter** with stable characteristics)
IT 7631-86-9, Silica, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(insulating layer; manufacture of MIM/MIS-type electron **emitter** with stable characteristics containing)
IT 1344-28-1, Alumina, processes 7429-90-5, Aluminum, processes
7440-21-3, Silicon, processes 7440-57-5, **Gold**, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of MIM/MIS-type electron **emitter** with stable characteristics containing)

L42 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1987:167309 HCAPLUS Full-text DN106:167309
TI Semiconductor device

IN Sasa, Masahiko
PA Agency of Industrial Sciences and Technology, Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 61268063	A2	19861127	JP 1985-109366	19850523
	JP 03030996	B4	19910501		

AB A semiconductor device such as a **tunneling** hot electron transfer amplifier or a hot electron transistor comprises the following: (1) a GaAs substrate; (2) an n-type GaAs **collector** contact **layer**; (3) an n-type GaAs **collector layer**; (4) an undoped AlGaAs 1st barrier **layer**; (5) a base **layer**, comprising an n-type GaAs **layer**, an atomic plane doping Si **layer**, and an undoped GaAs **layer**; (6) an undoped AlGaAs 2nd barrier **layer**; (7) an n-type GaAs **emitter layer**; and (8) an n-type GaAs **emitter** contact **layer**. On the 2nd, 5th, and 8th **layers**, **collector**, base, and **emitter** electrodes, comprising AuGe/**Au**, are formed. A neg. potential relative to the base electrode is applied to the **emitter** electrode and a neg. bias-potential relative to the **collector** electrode is applied to the base electrode. Thus, an electron travels from the 7th **layer** to the 6th **layer** by the **tunneling** effect, through the 5th **layer** at hot electron states, crossing the 4th **layer** potential barrier, and arriving at the 3rd **layer**. This semiconductor device has the base resistance 20-30 Ω vs. 100 Ω of the prior art, thus providing an improved current amplification, etc.

IC ICM H01L029-68
ICS H01L029-20
CC 76-3 (Electric Phenomena)
IT Electric amplifiers
(**tunneling** hot electron transfer, gallium arsenide/aluminum gallium arsenide, base **layers** for)
IT **7440-21-3**, Silicon, uses and miscellaneous
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(atomic-plane doping of base layers for semiconductor devices)

L42 ANSWER 7 OF 7 HCAPLUS
AN 1987:167308 HCAPLUS Full-text DN106:167308
TI Semiconductor device
IN Inada, Tsuguo; Muto, Shunichi
PA Agency of Industrial Sciences and Technology, Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 61268062	A2	19861127	JP 1985-109365	19850523
	JP 04022342	B4	19920416		

AB A semiconductor device such as a **tunneling** hot electron transfer amplifier or a hot electron transistor comprises the following: (1) a GaAs substrate; (2) an n-type GaAs **collector** contact **layer**; (3) an n-type GaAs **collector layer**; (4) an undoped AlGaAs 1st barrier **layer**; (5) a base **layer**, comprising multiple and equal-thickness **layers** of an undoped GaAs and a Si atomic plane doping **layer** between the formers; (6) an undoped AlGaAs 2nd barrier **layer**; (7) an n-type GaAs **emitter layer**; and (8) an n-type GaAs **emitter** contact **layer**. On the 2nd, 5th, and 8th **layers**, **collector**, base, and **emitter** electrodes, comprising AuGe/**Au**, are formed. A neg. potential relative to the base electrode is applied to the **emitter** electrode and a neg. bias-potential relative to the **collector** electrode is applied to the base electrode. Thus, an electron travels from the 7th **layer** to the 6th **layer** by the **tunneling** effect, through the 5th **layer** at hot electron states, crossing the 4th **layer** potential barrier, and arriving at the 3rd **layer**. This semiconductor device has the

base resistance 20-30 Ω vs. 100 Ω of the prior art, thus providing an improved current amplification, etc.

IC ICM H01L029-68
ICS H01L029-20

CC 76-3 (Electric Phenomena)
Section cross-reference(s): 74, 75

IT Electric amplifiers
(**tunneling** hot-electron transfer, gallium arsenide/aluminum gallium arsenide, base **layers** for)

IT **7440-21-3**, Silicon, uses and miscellaneous
RL: DEV (Device component use); USES (Uses)
(atomic plane doping, for gallium arsenide/aluminum gallium arsenide devices)

```
=================================================================================
L61  ANSWER 3 OF 30  HCAPLUS  COPYRIGHT 2004 ACS on STN
AN   2001:401324  HCAPLUS Full-text DN135:145215
TI   High-performance MOS tunneling cathode with CoSi2 gate
     electrode
AU   Sadoh, Taizoh; Zhang, Yi-Qun; Yasunaga, Hiroki; Kenjo, Atsushi;
     Tsurushima, Toshio; Miyao, Masanobu
SO   Japanese Journal of Applied Physics, Part 1: Regular Papers, Short Notes &
     Review Papers (2001), 40(4B), 2775-2778
     CODEN: JAPNDE; ISSN: 0021-4922
AB   The high performance of metal-oxide-semiconductor (MOS) tunneling cathodes
     with CoSi2 gates was demonstrated.  First, the deposition process of CoSi2 was
     optimized.  Stoichiometric CoSi2 films were formed by codeposition with Co and
     Si.  The elec. measurement suggested that deposition above 300° was necessary
     to obtain low-resistivity silicide films.  Second, operation characteristics
     were evaluated for MOS tunneling cathodes with CoSi2 gates formed at 400°.
     The emission efficiency increased with decreasing gate thickness and became as
     high as 1.5+10-3 for the 5 nm CoSi2 cathode.  The efficiency did not depend on
     the elec. field above 8.5 MV cm-1.  Thus, the CoSi2 gates were deemed suitable
     for operation at higher elec. fields to obtain larger emission currents.  The
     lifetime of the cathodes corresponded to 500 h for operation at 8.5 MV cm-1.
CC   76-3 (Electric Phenomena)
ST   MOS tunneling cathode cobalt silicide gate electrode
IT   Annealing
     Diodes
     Electric resistance
     Fowler-Nordheim tunneling
     Gate contacts
     MOS devices
     Thickness
        (high-performance MOS tunneling cathode with CoSi2
        gate electrode)
IT   12017-12-8, Cobalt silicide (CoSi2)
     RL: DEV (Device component use); PRP (Properties); USES (Uses)
        (high-performance MOS tunneling cathode with CoSi2
        gate electrode)

=================================================================================
L61  ANSWER 4 OF 30  HCAPLUS  COPYRIGHT 2004 ACS on STN
AN   2001:153710  HCAPLUS Full-text DN134:319431
TI   Carbon nano-/micro-structures in field emission: environmental
     stability and field enhancement distribution
AU   Nilsson, L.; Groning, O.; Groning, P.; Kuttel, O.; Schlapbach, L.
SO   Thin Solid Films (2001), 383(1,2), 78-80
     CODEN: THSFAP; ISSN: 0040-6090
AB   The field emission (FE) properties of carbon films can be understood in terms
     of local field enhancement β(x,y), which can be determined with x,y-scanning
     FE.  β(X,y) the spatial distribution of emitting sites, which can be counted
     as f(β)∝exp(- kβ). f(β) is connected with the presence of sharp protruding
     objects, whiskers or nanotubes on the surface.  Investigations of the current-
     time (I-t) characteristics of field emission from single-walled carbon
     nanotubes (SWNT) do not show any significant dependence on ambient partial
     pressures of hydrogen or water up to 10-5 mbar.  Oxygen however, causes a
     substantial reduction of the FE current. Field emission microscopy (FEM)
     during short-time nanotube annealing (.apprx.1000 K) reveals dim five-fold as
     well as six-fold fine structures, which are believed to be nanotube cap
```

states. The nanotube cap states have a short lifetime due to impinging atoms/ions that are adsorbed due to the high local elec. field at the cap (.apprx.3000 V/μm) and create resonant **tunneling** states. The anode material is believed to be the main source of adsorbed species and not the ambient gas phase.

CC 76-12 (Electric Phenomena)

ST carbon nanotube field **emission cathode** adsorbate

IT Adsorbed substances
  Annealing
 Controlled atmospheres
 Desorption
 Electronic state
 Field **emission cathodes**
  Tunneling
 Water vapor
  (carbon nano-/micro-structures in field **emission** and environmental stability and field enhancement distribution)

IT Nanotubes
 RL: DEV (Device component use); USES (Uses)
  (carbon; carbon nano-/micro-structures in field **emission** and environmental stability and field enhancement distribution)

IT 1333-74-0, Hydrogen, processes 7782-44-7, Oxygen, processes
 RL: PEP (Physical, engineering or chemical process); PROC (Process)
  (ambience; carbon nano-/micro-structures in field **emission** and environmental stability and field enhancement distribution)

IT 7440-44-0, Carbon, uses
 RL: DEV (Device component use); USES (Uses)
  (carbon nano-/micro-structures in field **emission** and environmental stability and field enhancement distribution)

==

L61 ANSWER 5 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 2001:92484 HCAPLUS Full-text DN134:274271

TI Photolithography-based carbon nanotubes patterning for field **emission** displays

AU Cho, Y.-R.; Lee, J. H.; Song, Y.-H.; Kang, S.-Y.; Hwang, C.-S.; Jung, M.-Y.; Kim, D.-H.; Lee, S.-K.; Uhm, H.-S.; Cho, K. I.

SO Materials Science & Engineering, B: Solid-State Materials for Advanced Technology (2001), B79(2), 128-132
 CODEN: MSBTEK; ISSN: 0921-5107

AB Carbon nanotubes (CNTs) **emitters** were successfully patterned in small pixels (50+50 μm2) by using photolithog. process on a hard metal electrode for field **emission** displays (FEDs) application. The CNTs particles in the patterned pixels were uniformly distributed on 2-in. diagonal substrates. The maximum diameter of CNTs particles could be controlled less than 20 μm. After patterning and **heat** treatment process below 300°C, most of CNTs bundles on the **cathode** electrode were aligned perpendicular to the substrates. The threshold elec. field of **emission** for patterned CNTs was about 4.2 V μm-1 and the field enhancement factor derived from the Fowler-Nordheim plots of the electron **emissions** was about 100000 in the high voltage region. This newly developed process can be applicable to field **emitter** arrays for high resolution FEDs.

ST photolithog carbon nanotube patterning field **emission** display

IT Optical imaging devices
  (field-**emission**; photolithog.-based carbon nanotubes patterning for field **emission** displays)

IT Electric field
 Electrodes

Field **emitters**
Fowler-Nordheim **tunneling**
Heat treatment
Nanotubes
Photolithography
(photolithog.-based carbon nanotubes patterning for field **emission** displays)
IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); USES (Uses)
(photolithog.-based carbon nanotubes patterning for field **emission** displays)

===

L61 ANSWER 6 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:789693 HCAPLUS Full-text DN130:89056
TI Electron field **emission** from amorphous carbon thin films as a function of **annealing**
AU Forrest, R. D.; Burden, A. P.; Khan, R. U. A.; Silva, S. R. P.
SO Surface and Coatings Technology (1998), 108-109(1-3), 577-582
CODEN: SCTEEJ; ISSN: 0257-8972
AB The electron field **emission** properties of nitrogenated hydrogenated amorphous carbon (a-C:H:N) thin films were analyzed, and the **emission** process modeled. The films were deposited on silicon substrates using a radio frequency plasma enhanced chemical vapor deposition system. The samples were subsequently **annealed** in a nitrogen atmospheric at a fixed temperature for times between 600 and 2400 s. The field **emission** current, I, was measured as a function of the macroscopic applied elec. field, E, using a sphere-to-plane electrode configuration. **Emission** current at fields as low as 10 V/μm were measured. There is a marked improvement in the **emission** characteristics with **annealing** of the films. A classical Fowler-Nordheim anal. on the exptl. data, assuming 'β' factors equal to unity, yielded unrealistic values for the **emission** barrier and **emission** area. Therefore, an alternate **emission** model based on band bending in the film is proposed to explain the exptl. results. In this model the substrate is the true **cathode** with the carbon film acting as a space charge interlayer.
CC 76-12 (Electric Phenomena)
ST carbon film **annealing** electron field **emission**; nitrogenation hydrogenation amorphous carbon thin film
IT Fowler-Nordheim **tunneling**
(anal. by; electron field **emission** from amorphous carbon thin films as a function of **annealing**)
IT Electric current-potential relationship
(elec. field; electron field **emission** from amorphous carbon thin films as a function of **annealing**)
IT **Annealing**
Band bending
Electric field
Field **emission**
Refractive index
Space charge
(electron field **emission** from amorphous carbon thin films as a function of **annealing**)
IT Configuration
(electron, sphere-to-plane; electron field **emission** from amorphous carbon thin films as a function of **annealing**)
IT Potential barrier

(**emission**; electron field **emission** from amorphous
carbon thin films as a function of **annealing**)
IT Electric current
(field **emission**; electron field **emission** from
amorphous carbon thin films as a function of **annealing**)
IT Vapor deposition process
(plasma, radio frequency; electron field **emission** from
amorphous carbon thin films as a function of **annealing**)
IT 7440-44-0, Carbon, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical
process); PRP (Properties); TEM (Technical or engineered material use);
PROC (Process); USES (Uses)
(amorphous, hydrogenated/nitrogenated, thin film **emitter**;
electron field **emission** from amorphous carbon thin films as a
function of **annealing**)

==

L61 ANSWER 7 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:664959 HCAPLUS Full-text DN129:324696
TI A contribution to the search for a stable field **emission**
electron source based on W-WOx-Au and W-Al2O3-Au systems
AU Knor, Z.; Biehl, St; Plsek, J.; Dvorak, L.; Edelmann, Chr
SO Vacuum (1998), 51(1), 11-19
CODEN: VACUAV; ISSN: 0042-207X
AB Field **emission** properties of metal-oxide-metal (MOM) **cathodes** (W-WOx-Au and W-Al2O3-Au) were investigated exptl. as potential cold point source of electrons for high resolution microscopes, spectroscopies and possibly also for pressure measurements in UHV. The stability as well as recovering problems were studied for the operation of these **cathodes** in presence of various gases (H2, He, Ne, Ar, CO, N2). The effect of pressure up to 10-6 mbar has been investigated. Tentative interpretation of the observed phenomena based on resonant **tunneling** through a double barrier system has been demonstrated together with a simple procedure (mild **heating** to red glow) for recovery of the initial **emission** current, which was lowered beforehand by operation of the **cathode** in pressure of gases with higher mol. wts. (CO, O2, N2, Ar). The negligible effect of the chemical nature of mols. as well as of low-mol. weight gases (H2, He) onto the **emission** current has been demonstrated.
CC 76-12 (Electric Phenomena)
Section cross-reference(s): 56, 57
ST tungsten oxide gold field **emission cathode**; alumina
tungsten gold electron source
IT Field **emission**
Field **emission cathodes**
Resonant **tunneling**
Spectroscopy
(a contribution to search for a stable field **emission**
electron source based on W-WOx-Au and W-Al2O3-Au systems)
IT Electron **emission**
(current; a contribution to search for a stable field **emission**
electron source based on W-WOx-Au and W-Al2O3-Au systems)
IT **Cathodes**
(metal/oxide/metal composite; a contribution to search for a stable
field **emission** electron source based on W-WOx-Au and
W-Al2O3-Au systems)
IT 1314-35-8, Tungsten oxide (WO3), properties 1344-28-1, Alumina,
properties 7440-33-7, Tungsten, properties 7440-57-5, Gold, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical

process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(metal/oxide/metal composite **cathode**; a contribution to search for a stable field **emission** electron source based on W-WOx-Au and W-Al2O3-Au systems)

==

L61 ANSWER 8 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:592476 HCAPLUS Full-text DN129:284398
TI Characteristics of surface-**emitting** cold **cathode** based on porous polysilicon
AU Komoda, Takuya; Sheng, Xia; Koshida, Nobuyoshi
SO Materials Research Society Symposium Proceedings (1998), 509(Materials Issues in Vacuum Microelectronics), 187-192
CODEN: MRSPDH; ISSN: 0272-9172
AB Porous polysilicon (PPS) diode fabricated on the Si substrate operates as efficient and stable surface-**emitting** cold **cathode**. A 1.5 μm of nondoped polysilicon layer is formed on n-type (100) Si wafer and anodized in a solution of HF(50%): EtOH = 1:1 at a c.d. of 10 mA/cm2 for 30 s under illumination by a 500W W lamp from a distance of 20 cm. Subsequently, PPS layer is oxidized in a **rapid thermal** oxidation(RTO) furnace for one hour at a temperature of 700°. A semi-transparent thin Au film (.apprx.10 nm thick) is deposited onto the PPS layer as a pos. electrode and an ohmic contact is formed at the back of the Si wafer as a neg. electrode. When a pos. bias is applied to the Au electrode in vacuum, the diode uniformly **emits** electrons. No electron **emission** is observed in the neg. biased region. **Emission** current is .apprx.10-4 A/cm2 at 20V bias, and no fluctuation of **emission** current is observed as a function of time. **Emission** current is not affected by a surrounding pressure up to around 10 Pa. It is envisaged that mechanism of this **emission** is attributed to hot electron **tunneling**.
CC 76-12 (Electric Phenomena)
ST cold **cathode** porous polysilicon diode fabrication
IT Diodes
Electron **emission**
Electronic device fabrication
Field **emission cathodes**
Porous materials
(characteristics of surface-**emitting** cold **cathode** based on porous polysilicon)
IT 7440-21-3, Silicon, processes 7440-57-5, Gold, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(characteristics of surface-**emitting** cold **cathode** based on porous polysilicon)

==

L61 ANSWER 9 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:201915 HCAPLUS Full-text DN128:315954
TI Electron **emission** from gated silicide field **emitter** arrays
AU Takai, M.; Iriguchi, T.; Morimoto, H.; Hosono, A.; Kawabuchi, S.
SO Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures (1998), 16(2), 790-792
CODEN: JVTBD9; ISSN: 0734-211X
AB Silicidation of the top surface of Si tips with a Nb gate structure has been carried out to improve the **emission** behavior of Si field **emitter** arrays (FEAs). A Pt layer with a thickness of 5-10 nm was deposited through the gate opening and **annealed** at 850 °C. The electron **emission** was enhanced by a

factor of 10 and the average **emission** per tip was 3.5 μA for a 10+10 FEA. Fowler-Nordheim plots indicated the decrease in work function after silicidation.
CC 76-12 (Electric Phenomena)
ST electron **emission** gated silicide field **emitter**
IT Fowler-Nordheim **tunneling**
(Fowler-Nordheim plots for Si field **emitter** arrays before and after Pt deposition)
IT Electron **emission**
Field **emission cathodes**
(electron **emission** from gated silicide field **emitter** arrays)
IT 7440-06-4, Platinum, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(deposition of Pt layer of thickness 5-10 nm through gate opening in field **emitter** arrays)

==

L61 ANSWER 10 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:596312 HCAPLUS Full-text DN127:286733
TI A novel structure of silicon field **emission cathode** with sputtered TiW for gate electrode
AU Kang, Sung Weon; Lee, Jin Ho; Yu, Byoung Gon; Cho, Kyoung Ik; Yoo, Hyung Joun
SO International Vacuum Microelectronics Conference, 9th, St. Petersburg, Russia, July 7-12, 1996 (1996), 398-402 Publisher: Nevskii Kur'er, St. Petersburg, Russia.
CODEN: 65AAA9
AB A novel techniques for a gated Si field **emission cathode** is proposed to decrease the spacing between tip and gate electrode of the device, leading to low voltage operation. This technique is based on the penetration of the sputtered Ti0.1W0.9 for the gate electrode to the shadowed area surrounding the tip with good step coverage, and is completely compatible to the conventional 1.2 μm CMOS standard processes. The gate hole diameter is greatly reduced to sub-half micron (.apprx. 0.4 μm) from the initial mask size (.apprx. 1.2 μm), and I-V characteristics of the **cathodes** show low turn-on voltages (.apprx. 25 V) in ultrahigh vacuum (< 3.0 + 10-7 Torr) and the good linearity of Fowler-Nordheim plots.
ST silicon field **emitter** sputtering titanium tungsten
IT Sputtering
(etching, reactive; properties and fabrication of silicon field-**emission cathode** with sputtered titanium-tungsten for gate electrode)
IT **Annealing**
Electric current-potential relationship
Electronic device fabrication
Field **emission cathodes**
Fowler-Nordheim **tunneling**
Ion implantation
Sputtering
(properties and fabrication of silicon field-**emission cathode** with sputtered titanium-tungsten for gate electrode)
IT Etching
(sputter, reactive; properties and fabrication of silicon field-**emission cathode** with sputtered titanium-tungsten for

gate electrode)
IT Oxidation
(thermal; properties and fabrication of silicon field-**emission**
cathode with sputtered titanium-tungsten for gate electrode)
IT Electric potential
(turn-on; properties and fabrication of silicon field-**emission**
cathode with sputtered titanium-tungsten for gate electrode)
IT 7440-21-3, Silicon, processes 7631-86-9, Silica, processes 82011-82-3,
Titanium 10, tungsten 90 (atomic)
RL: DEV (Device component use); PEP (Physical, engineering or chemical
process); PROC (Process); USES (Uses)
(properties and fabrication of silicon field-**emission**
cathode with sputtered titanium-tungsten for gate electrode)

==

L61 ANSWER 11 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:504469 HCAPLUS Full-text DN127:228259
TI Characteristics of silicon-field **emitter** arrays fabricated by
using wafers separated by implantation of oxygen
AU Matsuzaki, K.; Uematsu, T.; Ryokai, Y.; Amano, A.
SO Journal of the Electrochemical Society (1997), 144(7), 2538-2541
CODEN: JESOAN; ISSN: 0013-4651
AB The authors have presented a novel method for fabricating lateral Si-field
emitter arrays (Si-FEAs) by using wafers separated by implantation of O. This
fabrication process has the merit of being simple and compatible with IC
processing. The I-V characteristics of the lateral Si-FEAs shown in this
paper indicate a Fowler-Nordheim **tunneling** process.
CC 76-12 (Electric Phenomena)
ST SIMOX field **emitter** array silicon fabrication
IT Electric current-potential relationship
Electronic device fabrication
Etching
Field **emission cathodes**
Fowler-Nordheim **tunneling**
SOI devices
Sputtering
(characteristics of SIMOX fabricated silicon-field **emitter**
arrays)
IT Sputtering
(etching, reactive; characteristics of SIMOX fabricated silicon-field
emitter arrays)
IT **Annealing**
(hydrogen; characteristics of SIMOX fabricated silicon-field
emitter arrays)
IT Etching
(sputter, reactive; characteristics of SIMOX fabricated silicon-field
emitter arrays)
IT 1333-74-0, Hydrogen, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**annealing**; characteristics of SIMOX fabricated silicon-field
emitter arrays)
IT 7429-90-5, Aluminum, processes 7440-21-3, Silicon, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical
process); PROC (Process); USES (Uses)
(characteristics of SIMOX fabricated silicon-field **emitter**
arrays)
IT 7631-86-9, Silica, properties

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(characteristics of SIMOX fabricated silicon-field **emitter** arrays)

IT 7723-14-0, Phosphorus, processes
RL: MOA (Modifier or additive use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(characteristics of SIMOX fabricated silicon-field **emitter** arrays)

==

L61 ANSWER 13 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:262839 HCAPLUS Full-text DN126:323653
TI Defect state-assisted **tunneling** in intermediate temperature molecular beam epitaxy grown GaAs
AU Youtz, A. E.; Nabet, B.; Castro, F.
SO Journal of Electronic Materials (1997), 26(4), 372-375
CODEN: JECMA5; ISSN: 0361-5235
AB Current transport in MBE GaAs grown at low and intermediate growth temps. is strongly affected by defects. A model is developed here that shows that **tunneling** assisted by defect states can dominate, at some bias ranges, current transport in Schottky contacts to unannealed GaAs material grown at the intermediate temperature range of about 400°. The deep defect states are modeled by quantum wells which trap electrons **emitted** from the **cathode** before re-**emission** to semiconductor. Comparison of theory with exptl. data shows defect states of energies about 0.5 eV below the conduction band to provide the best fit to data. This suggests that arsenic interstitials are likely to mediate this conduction. Comparison is also made between as-grown material and GaAs grown at the same temperature but **annealed** at 600°. It is suggested that reduction of these defects by thermal **annealing** can explain lower current conduction at high biases in the **annealed** device as well as higher current conduction at low biases due to higher lifetime. Quenching of current by light in the as-grown material can also be explained based on occupancy of trap states. Identification of this mechanism can lead to its utilization in making ohmic contacts, or its elimination by growing **tunneling** barrier layers.
CC 76-1 (Electric Phenomena)
ST defect state **tunneling** gallium arsenide MBE
IT Defect level
Molecular beam epitaxy
Tunneling
(defect state-assisted **tunneling** in intermediate-temperature mol. beam epitaxy grown GaAs)
IT 1303-00-0, Gallium arsenide, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(defect state-assisted **tunneling** in intermediate-temperature mol. beam epitaxy grown GaAs)

==

L61 ANSWER 15 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:57785 HCAPLUS Full-text DN124:162252
TI **Emission** characteristics of ion-implanted silicon **emitter** tips
AU Hirano, Takayuki; Kanemaru, Seigo; Tanoue, Hisao; Itoh, Junji
SO Japanese Journal of Applied Physics, Part 1: Regular Papers, Short Notes & Review Papers (1995), 34(12B), 6907-11
CODEN: JAPNDE; ISSN: 0021-4922
AB An ion implantation technique was applied to control the energy band structure of Si field-**emitter** tip surface. B+ or P+ ions were implanted after

fabrication of a gated **emitter** structure. No changes in **emitter** structure were observed after ion implantation and successive **annealing** at 800°. Current-voltage (I-V) characteristics of n, p, p/n and n/p **emitter** tips were measured: p/n indicates an n-type tip with B+ ions implanted into the tip surface. It was found from the exptl. results that n and p/n tips had I-V characteristics in agreement with the Fowler-Nordheim theory. The p and n/p tips, however, exhibited a current saturation property in high elec. field. The present saturation mechanism is explained by considering the energy band structure of the tip surface.

CC 76-12 (Electric Phenomena)

ST silicon field **emission** ion implantation; boron ion implantation silicon field **emitter**; phosphorus ion implantation silicon field **emitter**; band structure silicon **emitter** ion implantation

IT **Annealing**
Energy level, band structure
(ion implantation and **annealing** technique to control energy band structure and **emission** characteristics of silicon field-**emitter** tip)

IT Photoelectric **emission**
(photosensitivity of silicon tips after ion implantation)

IT **Tunneling**
(Fowler-Nordheim, in **emission** from ion-implanted silicon field **emitter** tips)

IT **Cathodes**
(field-**emission**, ion implantation and **annealing** technique to control energy band structure and **emission** characteristics of silicon field-**emitter** tip)

IT 7440-42-8, Boron, uses 7723-14-0, Phosphorus, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(dopant profiles in ion-implanted silicon field **emitter** tips)

IT 7440-21-3, Silicon, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(ion implantation and **annealing** technique to control energy band structure and **emission** characteristics of silicon field-**emitter** tip)

IT 14594-80-0, Boron(1+), processes 16427-80-8, Phosphorus(1+), processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(ion implantation and **annealing** technique to control energy band structure and **emission** characteristics of silicon field-**emitter** tip)

===

L61 ANSWER 16 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1992:643459 HCAPLUS Full-text DN117:243459

TI Discrete conductance fluctuations in silicon **emitter** junctions due to defect clustering and evidence for structural changes by high-energy electron irradiation and **annealing**

AU Andersson, Gert I.; Andersson, Mats O.; Engstroem, Olof

SO Journal of Applied Physics (1992), 72(7), 2680-91
CODEN: JAPIAU; ISSN: 0021-8979

AB Observations of discrete conductance fluctuations are reported at voltages well below the breakdown voltage in selected reverse-biased p+-n++ base-**emitter** junctions originating from gate turn-off thyristors. The occurrence of the phenomenon is attributed to the presence of defect clusters at the p-n

junctions. The defect clusters introduce field confinements which activate **tunneling** processes that would not otherwise be present in these nonabrupt p-n junctions. The fluctuating reverse current was only observed in voltage and temperature regions where the total reverse current was influenced by **tunneling**-related conduction mechanisms. The exptl. observations concerning the voltage and temperature dependences of the fluctuation amplitude and rate deviate from earlier reports on decisive points. Both the amplitude and the switching rate of the observed fluctuations were unstable in time and influenced by the measurement procedure itself. This instability is attributed to small structural changes of the defect clusters. Further, the unstable behavior of the defect clusters also influences the static reverse current-voltage characteristics. Distinct changes were found in the static reverse current-voltage characteristics of selected samples due to high-energy electron irradiation and **annealing** at 200°. A clearly increased uniformity of the reverse current-voltage characteristics between the gate-**cathode** junctions of gate-turn off thyristors was also found as a result of electron irradiation The changes observed are interpreted as evidence of structural changes of the defect clusters.

ST silicon base **emitter** junction cond fluctuation

IT Electric conductivity and conduction
(fluctuations of, in silicon reverse-biased p+-n++ base-**emitter** junctions)

IT 7440-21-3, Silicon, uses
RL: USES (Uses)
(p+-n++ base-**emitter** junctions, discrete conductance fluctuations in)

==

L61 ANSWER 21 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1977:114279 HCAPLUS Full-text DN86:114279

TI Aging and state of the photo-field-**cathode** surface

AU But, Z. P.; Yatsenko, A. F.

SO Ukrainskii Fizicheskii Zhurnal (Russian Edition) (1977), 22(1), 140-5
CODEN: UFIZAW; ISSN: 0503-1265

AB Study of the time and surface-state dependences of the photo-field- **emission** properties of Si, Ge, and GaAs showed that freshly prepared **cathodes** had the best **emission** properties and that aging during either use or storage, **heating** in vacuum at 300-450°, and adsorption of BaO and Cs were all accompanied by an increase in dark current, a decrease in its activation energy, and a decrease in the photosensitivity region on the current-voltage characteristic. Renewal of the **emitting** region by field desorption and chemical etching of the whole surface improved the characteristics of the photo-field **cathodes**. The data are considered from the point of view of **tunneling** from surface electron states.

CC 76-5 (Electric Phenomena)

ST photo field **cathode**; aging photo field **cathode**; surface photo field **cathode**; silicon photo field **cathode** ; germanium photo field **cathode**; gallium arsenide photo field **cathode**; arsenide gallium photo field **cathode**

IT Adsorbed substances
(barium oxide and cesium, on **cathodes**, surface state in relation to)

IT Energy level, surface
(of **cathodes**, effects of aging on)

IT Etching
(of **cathodes**, improvement by)

IT **Cathodes**

(photo-, aging and surface state of)

==

L61 ANSWER 24 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1972:494289 HCAPLUS Full-text DN77:94289

TI **Emission** properties of cold **cathodes** based on tin dioxide (SnO2) films

AU Nikulov, V. V.; Kudintseva, G. A.; Elinson, M. I.; Kosul'nikova, L. A.

SO Radiotekhnika i Elektronika (Moscow, Russian Federation) (1972), 17(7), 1471-8
CODEN: RAELA4; ISSN: 0033-8494

AB The mechanism of vacuum electron **emission** by a cold-**cathode emitter** (SnO2 on quartz) with a gap in the SnO2 film (M. I. Elinson, et al., 1965) was studied by obtaining current-voltage characteristics with the application of a sinusoidal a.c., oscillograms of the direct and **emission** current, and the spectra of the **emitted** electrons for **emitters** with and without a monomol. layer of BaO on the SnO2 film surface. The current through the gap in the SnO2 is connected with electron **emission** into vacuum by the **tunnel** mechanism. At >50 V, secondary electrons from the pos. side of the film contribute markedly to the **emission** current. The electron **emission** from the gap in the SnO2 film is attributed to the formation of small spots of SnO2 on quartz during the 2nd stage of the formation of the gap (**heat** treatment and elec. breakdown).

CC 71-5 (Electric Phenomena)

ST **emission** cold **cathode**; cold **cathode** electron **emitter**; **cathode** cold electron **emitter**; electron **emitter** cold **cathode**; tin dioxide electron **emitter**

IT Electron **emission**
(from tin dioxide films)

===

L62 ANSWER 2 OF 6 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:664631 HCAPLUS DN139:269042
TI Electron field **emission** from SiOx films
AU Evtukh, A. A.; Indutnyy, I. Z.; Lisovskyy, I. P.; Litvin, Yu. M.; Litovchenko, V. G.; Lytvyn, P. M.; Mazunov, D. O.; Rassamakin, Yu. V.; Shepeliavyi, P. E.
CS Institute of Semiconductor Physics, NAS of Ukraine, Kiev, 03028, Ukraine
SO Semiconductor Physics, Quantum Electronics & Optoelectronics (2003), 6(1), 32-36 CODEN: SPQEAN
PB National Academy of Sciences of Ukraine, Institute of Semiconductor Physics
AB The electron field **emission** from the surface of SiOx films with rather small O content (x ≈ 0.3-0.5) was studied. Both initial and high temperature **annealed** films were considered. Efficient electron field **emission** from Si flat **cathode** coated with SiOx film was observed both before and after thermal **annealing** with subsequent etching in HF solution Oxide films were produced by Si thermal evaporation in vacuum. Initial SiOx film may be represented as SiO2(Si) composite. Thermal **annealing** causes further phase segregation in film material, and it is transformed into SiO2 composite. During such a process, Si grain size decreases and their d. increases. The model of electron field **emission** from the surface of such films is proposed and was supposed that limitation process of the current flow under high elec. fields is connected with Fowler-Nordheim **tunneling** through barriers Si-SiOx-vacuum or Si-vacuum.
CC 76-12 (Electric Phenomena)
Section cross-reference(s): 57
ST electron field **emission** silicon oxide flat **cathode** nanostructure
IT **Annealing**
(electron field **emission** from silicon oxide films after)
IT Ceramic composites
Field **emission cathodes**
(field **emission** from silicon/silica composites)
IT Field **emission**
(from silicon oxide films)
IT Density
Fowler-Nordheim **tunneling**
Grain size
IR spectra
Optical absorption
Phase separation
Surface roughness
(in **annealed** silicon oxide films)
IT 129737-53-7P, Silicon oxide (SiO0.3)
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
(field **emission** and spectra of films of)
IT 7440-21-3P, Silicon, uses 7631-86-9P, Silica, uses
RL: PNU (Preparation, unclassified); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(field **emission** from silicon/silica composites)

L62 ANSWER 3 OF 6 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:849960 HCAPLUS Full-text DN137:361589
TI Silicon-based dielectric **tunneling emitter**
IN **Chen, Zhizhang; Bice, Michael David; Enck, Ronald L.; Regan, Michael J.; Novet, Thomas; Benning, Paul J.**
PA Hewlett-Packard Company, USA

FYI Applicants

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002089168	A2	20021107	WO 2002-US12258	20020416
	US 2002167021	A1	20021114	US 2001-846047	20010430
	EP 1384243	A2	20040128	EP 2002-721776	20020416

PRAI US 2001-846047 20010430
AB The invention is directed to field **emission** devices. In particular, the invention is directed to the flat field **emission emitters** utilizing direct **tunneling** and their use in electronic devices. An **emitter** has an electron supply layer and a Si-based dielec. layer formed on the electron supply layer. The Si-based dielec. layer is preferably .ltorsim.500 Å. Optionally, an insulator layer is formed on the electron supply layer and has openings defined within in which the Si-based dielec. layer is formed. A **cathode** layer is formed on the Si-based dielec. layer to provide a surface for energy **emissions** of electrons and/or photons. Preferably, the **emitter** is subjected to an **annealing** process thereby increasing the supply of electrons **tunneled** from the electron supply layer to the **cathode** layer.

L62 ANSWER 4 OF 6 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:845442 HCAPLUS Full-text
TI **Tunneling emitter**
IN Chen, Zhizhang; Regan, Michael J.; Bolf, Brian E.; Novet, Thomas; Benning, Paul; Johnstone, Mark Alan; Ramamoorthi, Sriram
PA Hewlett-Packard Company, USA

FYI Application

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002089167	A2	20021107	WO 2002-US12257	20020416
	WO 2002089167	A3	20030501		
	US 2002167001	A1	20021114	US 2001-846127	20010430
	EP 1384244	A2	20040128	EP 2002-723897	20020416
	US 2003089900	A1	20030515	US 2002-263055	20021001
	EP 1406284	A2	20040407	EP 2003-255972	20030923

PRAI US 2001-846127 20010430
AB An **emitter** (50,100) has an electron supply layer (10) and a **tunneling** layer (20) formed on the electron supply layer. Optionally, an insulator layer (78) is formed on the electron supply layer and has openings defined within in which the **tunneling** layer is formed. A **cathode** layer (14) is formed on the **tunneling** layer to provide a surface for energy **emissions** (22) of electrons (16) and/or photons (18). Preferably, the **emitter** is subjected to an **annealing** process (120,122) thereby increasing the supply of electrons **tunneled** from the electron supply layer to the **cathode** layer.

L62 ANSWER 6 OF 6 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1970:116011 HCAPLUS Full-text DN72:116011
TI Electroluminescent material
IN Chase, Eugene W.; Hepplewhite, Ralph T.; Kahng, Dawon
PA Western Electric Co., Inc.

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 1939994		19700219		
	GB 1284882			GB	

PRAI US 19680812

AB The preparation is described of thin electro- or cathodoluminescent layers consisting of 0.1-30 mole % luminescent material embedded in a solid semiconducting host material. As host material can be used compds. of the AIIBVI (ZnO, ZnS, ZnTe, CdS) and AIIIBV (GaAs, GaP) types, Group IV elements and compds., e.g. C, SiC, Ge, and CdF2. Suitable luminescent compds. were fluorides of rare earth and transition metals, such as ErF3, EuF3, NdF3, and MnF2. Due to their low temperature of vaporization, they remained practically undissocd. and uniformly distributed in the host lattice during preparation Layers 1000-5000 Å thick were obtained by vapor deposition at 10-5-5 + 10-5 torr in a conventional vacuum chamber. Host and luminescent material were **heated** sep. below their dissociation temps. and deposited simultaneously on a substrate kept at room temperature A number of host and luminescent compds., their resp. **heating** temps., and colors of **emission** are tabulated. Electroluminescence in the layers is generated by majority carrier injection at an applied field strength of .apprx.5 + 105 V/cm. Three typical electroluminescent cells are described, producing charge carriers either by **tunnel** injection contacts, Schottky injection contacts or by leaking blocking contacts. The cells are used in lamps, picture screens, and **cathode**-ray tubes.

15/5,K/1
DIALOG(R)File 2:INSPEC

7647133 INSPEC Abstract Number: B2003-07-2860F-003
Title: NiCr bottom electrodes for Ta/sub 2/O/sub 6/ high dielectric thin films in metal-insulator-metal capacitors
Author(s): Eung-Min Lee; Soon-Gil Yoon
Journal: Integrated Ferroelectrics Conference Title: Integr. Ferroelectr. (Netherlands) vol.47 p.41-8
Publisher: Gordon & Breach,
Publication Date: 2002 Country of Publication: Netherlands
CODEN: IFEREU ISSN: 1058-4587
Abstract: NiCr bottom electrodes are prepared onto p-type Si (100) substrates to replace the Pt bottom electrode with a new one for integration of high dielectric constant materials. NiCr thin films deposited in Ni and Cr power of 80 and 30 W, respectively showed optimum properties in the composition of Ni/sub 7/Cr/sub 3/. NiCr thin films were crystallized after annealing at high temperature. The resistivities of NiCr thin films annealed both at 600 degrees C for 30 min in O/sub 2/ and 700 degrees C for 3 min in 2*10/sup -5/ torr were approximately 200 Omega -cm. 30 nm-thick Ta/sub 2/O/sub 5/ thin films deposited at room temperature on NiCr bottom electrode (annealed at 700 degrees C for 3 min in 2*10/sup -5/ torr) were annealed at 600 to 800 degrees C for 5 min in an O/sub 2/ ambient. The dissipation factor and the leakage current of Ta/sub 2/O/sub 5/ thin films increased with increasing annealing temperature. The dielectric constant, the dissipation factor and leakage current density of Ta/sub 2/O/sub 5/ thin films annealed at 600 degrees C showed 18 and 2% at 100 kHz, and 1.9*10/sup -6/ A/cm/sup 2/ at an applied field of 333 kV/cm, respectively. (11 Refs)
Subfile: B
Descriptors: **annealing**; chromium alloys; dielectric materials; electrical resistivity; **electrodes**; ferroelectric capacitors; leakage currents; MIM devices; nickel alloys; permittivity; tantalum compounds
Identifiers: NiCr bottom electrodes; Ta/sub 2/O/sub 6/ high dielectric thin film; metal-insulator-metal capacitors; high dielectric constant materials; annealing; resistivity; dissipation factor; leakage current; leakage current density; 80 W; 30 W; 30 min; 700 degC; 3 min; 2*10/sup -5/ torr; 200 ohmcm; 30 nm; 300 K; 600 to 800 degC; 5 min; 100 kHz; NiCr; Ta/sub 2/O/sub 6/; Si
Class Codes: B2860F (Ferroelectric devices); B2130 (Capacitors)
Chemical Indexing:
NiCr int - **Cr** int - Ni int - NiCr bin - **Cr** bin - Ni bin (Elements - 2)
Ta2O6 int - Ta2 int - O6 int - Ta int - O int - Ta2O6 bin - Ta2 bin - O6 bin - **Ta bin** - **O bin** (Elements - **2**)
Si sur - Si el (Elements - 1)
Numerical Indexing: power 8.0E+01 W; power 3.0E+01 W; time 1.8E+03 s; temperature 9.73E+02 K; time 1.8E+02 s; pressure 2.7E-03 Pa; electrical resistivity 2.0E+00 ohmm; size 3.0E-08 m; temperature 3.0E+02 K; temperature 8.73E+02 to 1.07E+03 K; time 3.0E+02 s; frequency 1.0E+05 Hz

==

15/5,K/2
DIALOG(R)File 2:INSPEC

7636708 INSPEC Abstract Number: B2003-06-2560R-097
Title: Evaluation of candidate metals for dual-metal gate CMOS with HfO/sub 2/ gate dielectric
Author(s): Samavedam, S.B.; Schaeffer, J.K.; Gilmer, D.C.; Dhandapani, V. ; Tobin, P.J.; Mogab, J.; Nguyen, B.-Y.; Dakshina-Murthy, S.; Rai, R.S.; Jiang, Z.-X.; Martin, R.; Raymond, M.V.; Zavala, M.; La, L.B.; Smith, J.A.; Gregory, R.B.
Journal: Journal of Materials Science vol.37, no.16 p.3515-20
Publisher: Kluwer Academic Publishers,
Publication Date: 15 Aug. 2002 Country of Publication: USA
CODEN: JMTSAS ISSN: 0022-2461
Abstract: Ti/TiO/sub 2//IrO/sub 2/-RuO/sub 2/ electrodes were evaluated with an aid of Taguchi method and orthogonal arrays to elucidate the effect of the experimental parameters, such as type of intermediate layer between Ti substrate and IrO/sub 2/-RuO/sub 2/ film, heat treatment temperature, heat treatment time, and flow rate of air, on the corrosion resistance of the electrodes. Although the chemical composition of the as-deposited IrO/sub 2/-RuO/sub 2/ films was almost identical regardless of the processing conditions, it was found that the presence and the type of the TiO/sub 2/ intermediate layer was a critical factor to the anticorrosion properties of the Ti/TiO/sub 2//IrO/sub 2/-RuO/sub 2/ electrodes among four different experimental parameters investigated. The optimal condition was the dip-coated IrO/sub 2/-RuO/sub 2/ film having the TiO/sub 2/ intermediate layer prepared by plasma spray and subsequently heat treated for 120 min at 450 degrees C with air flow rate of 3 sccm. (10 Refs)
Descriptors: corrosion resistance; current density; **electrochemical electrodes; heat treatment**; iridium compounds; liquid phase deposited coatings; plasma arc sprayed coatings; ruthenium compounds; thin films
Identifiers: corrosion rate; Taguchi method; orthogonal arrays; Ti/TiO/sub 2//IrO/sub 2/-RuO/sub 2/ electrodes; TiO/sub 2/ intermediate layer; air flow rate; Ti substrate; intermediate layer; heat treatment temperature; heat treatment time; flow rate; air; corrosion resistance; chemical composition; processing conditions; anticorrosion properties; plasma spray; as-deposited IrO/sub 2/-RuO/sub 2/ films; dip-coated IrO/sub 2/-RuO/sub 2/ film; 120 min; 450 C; Ti; IrO/sub 2/-RuO/sub 2/; Ti-TiO/sub 2/; TiO/sub 2/-IrO/sub 2/RuO/sub 2/
Class Codes: A8160D (Surface treatment and degradation of ceramics and refractories); A8245 (Electrochemistry and electrophoresis); A6855 (Thin film growth, structure, and epitaxy); A8115L (Deposition from liquid phases (melts and solutions)); A8115R (Spray coating techniques); A5275R (Plasma applications in manufacturing and materials processing); **A8140G** (
Other heat and thermomechanical treatments
Chemical Indexing:
Ti sur - Ti el (Elements - 1)
IrO2RuO2 sur - Ir sur - O2 sur - Ru sur - O sur - IrO2RuO2 ss - **Ir ss** - O2 ss - **Ru ss** - O ss (Elements - 3)
Ti-TiO2 int - TiO2 int - O2 int - Ti int - O int - TiO2 bin - O2 bin - **Ti bin - O bin** - Ti el (Elements - 1,**2**,**2**)
TiO2-IrO2RuO2 int - IrO2RuO2 int - TiO2 int - Ir int - O2 int - Ru int - Ti int - O int - IrO2RuO2 ss - **Ir ss** - O2 ss - **Ru ss** - O ss - TiO2 bin - O2 bin - **Ti bin - O bin** (Elements - **2**,3,4)
Numerical Indexing: time 7.2E+03 s; temperature 7.23E+02 K

==

15/5,K/6
DIALOG(R)File 2:INSPEC

6828910 INSPEC Abstract Number: A2001-05-8160B-034
Title: The influence of the aging time of RuO/sub 2/ sol on the electrochemical properties of the activated titanium anodes obtained by sol-gel procedure
Author(s): Panic, V.; Dekanski, A.; Milonjic, S.K.; Atanasoski, R.; Nikolic, B.
Journal: Materials Science Forum Conference Title: Mater. Sci. Forum (Switzerland) vol.352 p.117-22
Publisher: Trans Tech Publications,
Publication Date: 2000 Country of Publication: Switzerland
CODEN: MSFOEP ISSN: 0255-5476
Abstract: The influence of the aging time of RuO/sub 2/ sol on the electrochemical properties and behaviour in chlorine evolution reaction of RuO/sub 2//Ti and (40%RuO/sub 2/+60%TiO/sub 2/)/Ti anodes obtained by sol-gel procedure was studied. The electrochemically active surface area of the anode coatings was examined by cyclic voltammetry. The electrocatalytic activity and anode stability in chlorine evolution reaction were investigated by polarization measurements and accelerated stability test. The dependence of electrochemical properties of obtained activated titanium anodes on RuO/sub 2/ particle size was established. (18 Refs)
Descriptors: ageing; **anodes**; catalysis; electrochemistry; particle size; sol-gel processing; sols; titanium; voltammetry (chemical analysis
Identifiers: activated titanium anodes; sol-gel procedure; electrochemical properties; sol; aging time; chlorine evolution reaction; electrocatalytic activity; cyclic voltammetry; polarization measurement; accelerated stability test; particle size; Ti; RuO/sub 2/; RuO/sub 2/-TiO/sub 2/; TiO/sub 2/
Class Codes: A8160B (Surface treatment and degradation of metals and alloys); A8115L (Deposition from liquid phases (melts and solutions)); **A8140G** (Other heat and thermomechanical treatments); A8245 (Electrochemistry and electrophoresis); A8265J (Heterogeneous catalysis at surfaces and other surface reactions); A8270G (Gels and sols); A8280F (Electrochemical analytical methods
Chemical Indexing:
Ti sur - Ti el (Elements - 1)
RuO2 bin - O2 bin - Ru bin - O bin (Elements - 2)
RuO2TiO2 ss - O2 ss - **Ru ss** - Ti ss - O ss (Elements - 3)
TiO2 bin - O2 bin - **Ti bin - O bin** (Elements - **2**)

==

15/5,K/7
DIALOG(R)File 2:INSPEC

6524718 INSPEC Abstract Number: A2000-08-7755-003, B2000-04-2810F-038
Title: Impact of changes in the Pt heterostructure bottom electrodes on the ferroelectric properties of SBT thin films
Author(s): Seung-Hyun Kim; Kim, D.J.; Im, J.; Streiffer, S.K.; Auciello, O.; Maria, J.-P.; Kingon, A.I.
Journal: Integrated Ferroelectrics Conference Title: Integr. Ferroelectr. (Netherlands) vol.26, no.1-4 p.253-68
Publisher: Gordon & Breach,

Publication Date: 1999 Country of Publication: Netherlands
CODEN: IFEREU ISSN: 1058-4587
Abstract: The crystallinity and the microstructure of Sr/sub 0.8/Bi/sub 2.3/Ta/sub 2/O/sub 9/ (SBT) thin films improved with increasing annealing temperature, and strongly influenced the ferroelectric properties. In addition, the properties of SBT films, such as remanent polarization and leakage current density, are closely related to the film/electrode interface and surface roughness of the underlying electrode. SBT films on Pt/TiO/sub 2//SiO/sub 2//Si and Pt/ZrO/sub 2//SiO/sub 2//Si substrates exhibited high remanent polarization, low leakage current density, and low voltage saturation as compared to SBT films on Pt/Ti/SiO/sub 2//Si substrates. This is deduced to be related to differences in film orientation, electrode roughness, and out-diffusion of Ti onto the surface of the bottom electrode. (17 Refs)
Descriptors: **annealing**; bismuth compounds; crystal microstructure; current density; dielectric polarisation; **electrodes**; ferroelectric materials; ferroelectric thin films; leakage currents; platinum; rough surfaces; strontium compounds; surface diffusion; surface topography
Identifiers: Pt heterostructure bottom electrodes; ferroelectric properties; SBT thin films; crystallinity; microstructure; Sr/sub 0.8/Bi/sub 2.3/Ta/sub 2/O/sub 9/; annealing temperature; remanent polarization; leakage current density; film/electrode interface; surface roughness; Pt/ZrO/sub 2//SiO/sub 2//Si substrate; Pt/TiO/sub 2//SiO/sub 2//Si substrate; high remanent polarization; low voltage saturation; film orientation; electrode roughness; Ti out-diffusion; Pt-TiO/sub 2/-SiO/sub 2/-Si; Pt-ZrO/sub 2/-SiO/sub 2/-Si
Class Codes: A7755 (Dielectric thin films); A7780 (Ferroelectricity and antiferroelectricity); **A6170A** (Annealing processes); A6820 (Solid surface structure); A6480G (Microstructure); A7730 (Dielectric polarization and depolarization effects); A6822 (Surface diffusion, segregation and interfacial compound formation); B2810F (Piezoelectric and ferroelectric materials
Chemical Indexing:
Sr0.8Bi2.3Ta2O9 int - Bi2.3 int - Sr0.8 int - Ta2 int - Bi int - O9 int - Sr int - Ta int - O int - Sr0.8Bi2.3Ta2O9 ss - Bi2.3 ss - Sr0.8 ss - Ta2 ss - Bi ss - O9 ss - Sr ss - **Ta ss** - O ss (Elements - 4)
Pt-TiO2-SiO2-Si int - SiO2 int - TiO2 int - O2 int - Pt int - Si int - Ti int - O int - SiO2 bin - TiO2 bin - O2 bin - Si bin - **Ti bin - O bin** - Pt el - Si el (Elements - 1,**2**,**2**,1,4)
Pt-ZrO2-SiO2-Si int - SiO2 int - ZrO2 int - O2 int - Pt int - Si int - Zr int - O int - SiO2 bin - ZrO2 bin - O2 bin - Si bin - Zr bin - O bin - Pt el - Si el (Elements - 1,2,2,1,4)

==
15/5,K/8
DIALOG(R)File 2:INSPEC

5831227 INSPEC Abstract Number: A9806-6630N-002
Title: Interfacial stability between Ta-Sn-O films and indium tin oxide electrodes
Author(s): Satoh, T.; Fujikawa, H.; Ishii, M.; Ohwaki, T.; Taga, Y.
Journal: Japanese Journal of Applied Physics, Part 2 (Letters) vol.36, no.12B p.L1699-701
Publisher: Publication Office, Japanese Journal Appl. Phys,
Publication Date: 15 Dec. 1997 Country of Publication: Japan

CODEN: JAPLD8 ISSN: 0021-4922
Abstract: Interfacial structures between Ta/sub 2/O/sub 5/-SnO/sub 2/ (Ta-Sn-O) films and indium tin oxide (ITO) electrodes were studied using transmission electron microscopy (TEM) and secondary ion mass spectroscopy (SIMS). It was found that indium atoms diffused into the Ta/sub 2/O/sub 5/ film by annealing (at 923 K for 30 min in N/sub 2/ atmosphere), while diffusion was not observed at the Ta-Sn-O/ITO interface. The thermal stability of the interfaces of Ta/sub 2/O/sub 5//ITO and Ta-Sn-O/ITO can be explained in terms of the difference of the diffusion behavior at the interface, which affects the superior electrical properties of the Ta-Sn-O/ITO structures. (11 Refs)
Descriptors: **annealing**; chemical interdiffusion; **electrodes**; indium compounds; insulating thin films; interface structure; metal-insulator boundaries; secondary ion mass spectra; surface diffusion; tantalum compounds; thermal stability; tin compounds; transmission electron microscopy
Identifiers: interfacial stability; interfacial structure; ITO electrodes ; Ta-Sn-O films; Ta/sub 2/O/sub 5/-SnO/sub 2/ films; Ta/sub 2/O/sub 5/ film ; transmission electron microscopy; TEM; secondary ion mass spectroscopy; In atoms diffusion; annealing; thermal stability; electrical properties; N/sub 2/ atmosphere; 923 K; ITO-Ta/sub 2/O/sub 5/; ITO-TaSnO; Ta/sub 2/O/sub 5/-SnO/sub 2/; Ta/sub 2/O/sub 5/:SnO/sub 2/; InSnO-Ta2O5; InSnO-TaSnO
Class Codes: A6630N (Chemical interdiffusion in solids); A7360H (Electronic properties of insulating thin films); A7920N (Atom-, molecule-, and ion-surface impact); **A8140G** (Other heat and thermomechanical treatments); A6822 (Surface diffusion, segregation and interfacial compound formation); A6848 (Solid-solid interfaces); A7340N (Metal-nonmetal contacts
Chemical Indexing:
InSnO-Ta2O5 int - InSnO int - Ta2O5 int - Ta2 int - In int - O5 int - Sn int - Ta int - O int - InSnO ss - In ss - Sn ss - O ss - Ta2O5 bin - Ta2 bin - O5 bin - **Ta bin** - **O bin** (Elements - 3,2,4)
InSnO-TaSnO int - InSnO int - TaSnO int - In int - Sn int - Ta int - O int - InSnO ss - TaSnO ss - In ss - Sn ss - **Ta ss** - O ss (Elements - 3,3,4)
Ta2O5SnO2 ss - Ta2 ss - O2 ss - O5 ss - Sn ss - **Ta ss** - O ss (Elements - 3)
Ta2O5:SnO2 int - Ta2O5 int - Ta2 int - O2 int - O5 int - Sn int - Ta int - O int - Ta2O5:SnO2 ss - Ta2 ss - O2 ss - O5 ss - Sn ss - **Ta ss** - O ss - Ta2O5 bin - SnO2 bin - Ta2 bin - O2 bin - O5 bin - Sn bin - **Ta bin** - **O bin** - SnO2 dop - O2 dop - Sn dop - O dop (Elements - **2,2**,3)
Numerical Indexing: temperature 9.23E+02 K

17/5,K/1
DIALOG(R)File 2:INSPEC

5316061 INSPEC Abstract Number: A9616-8630G-082, B9608-8410G-087
Title: Influence of additives on interfacial properties between Ni and YSZ
Author(s): Naoumidis, A.; Tsoga, A.; Nikolopoulos, P.; Grubmeier, H.
Conference Title: Proceedings of the Fourth International Symposium on Solid Oxide Fuel Cells (SOFC-IV) p.667-75
Editor(s): Dokiya, M.; Yamamoto, O.; Tagawa, H.; Singhal, S.C.
Publisher: Electrochem. Soc, Pennington, NJ, USA
Publication Date: 1995 Country of Publication: USA xvii+1171 pp.
Conference Sponsor: Electrochem. Soc.; SOFC Soc. Japan; Comm. Eur. Union
Conference Date: 18-23 June 1995 Conference Location: Yokohama, Japan

Abstract: The properties of the interface between Ni and YSZ can be influenced by the addition of reactive elements (Ti, Cr, Mn and Pd) to the Ni or the use of an interlayer consisting of the oxides of the reactive elements. Wettability experiments (1500 degrees C) showed the lowest contact angle (Theta =103 degrees) for the system YSZ/TiO/sub 2//Ni. The carbon activity in metallic **melt** causes reduction of the oxide at the interface, leading to improved wetting conditions. This interaction is enhanced with increasing time and carbon activity. The reaction products were identified by EPMA and interpreted by thermodynamic considerations. (7 Refs)

Descriptors: **anodes**; **electrochemical electrodes**; electron probe analysis; fuel cells; interface phenomena; nickel; thermodynamics; wetting; yttrium compounds; zirconium compounds

Identifiers: electron probe microanalysis; interfacial properties; Ni; YSZ; additives influence; Ti additive; Cr additive; Mn additive; Pd additive; reactive elements; interlayer; wettability experiments; lowest contact angle; YSZ/TiO/sub 2//Ni system; carbon activity; metallic **melt**; wetting conditions; EPMA; thermodynamic considerations; reaction products; ZrO/sub 2/-Y/sub 2/O/sub 3/-Ni; anode; 1500 C; Ni-ZrO/sub 2/-Y/sub 2/O/sub 3/; Ti; Cr; Mn; Pd; ZrO/sub 2/-Y/sub 2/O/sub 3/-TiO/sub 2/-Ni

Class Codes: A8630G (Fuel cells); A8245 (Electrochemistry and electrophoresis); B8410G (Fuel cells)

Chemical Indexing:
Ni-ZrO2-Y2O3 int - Y2O3 int - ZrO2 int - Ni int - O2 int - O3 int - Y2 int - Zr int - O int - Y int - Y2O3 bin - ZrO2 bin - O2 bin - O3 bin - Y2 bin - Zr bin - O bin - Y bin - Ni el (Elements - 1,2,2,4)
Ti el (Elements - 1)
Cr el (Elements - 1)
Mn el (Elements - 1)
Pd el (Elements - 1)
ZrO2-Y2O3-TiO2-Ni int - TiO2 int - Y2O3 int - ZrO2 int - Ni int - O2 int - O3 int - Ti int - Y2 int - Zr int - O int - Y int - TiO2 bin - Y2O3 bin - ZrO2 bin - O2 bin - O3 bin - **Ti bin** - Y2 bin - Zr bin - **O bin** - Y bin - Ni el (Elements - **2,2,2**,1,5)

Numerical Indexing: temperature 1.77E+03 K